
**User's
Manual**

**Harmonic Measurement
Software
(IEC 61000-3-2 Compliant)**

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Thank you for purchasing the Harmonic Measurement Software (Model 761922). This user's manual describes the handling precautions, functions, and operating procedures of the Harmonic Measurement Software within the Harmonic/Flicker Measurement Software. To ensure correct use, please read this manual thoroughly before beginning operation.

Keep this manual in a safe place for quick reference in the event a question arises. For information about the handling precautions, functions, and operating procedures of WT3000 Precision Power Analyzer (models 760301, 760302, 760303, and 760304) and the Voltage Fluctuation and Flicker Measurement Software as well as the handling and operating procedures for Windows, see the manuals for those products.

Notes

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Revisions

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Notes about Using This Software

Storing the CD-ROM

Keep the original CD-ROM for this software in a safe place. To use this software, install it on a PC hard disk, and run it from the PC.

Using the Software

- Do not operate the WT while using this software. Doing so may cause errors.
- Disable the PC's standby mode. When a PC goes into standby mode, it may stop this software's operations.
- This software can only control one WT at a time. Also, it cannot connect multiple PCs to the same WT.
- If a connection error disrupts the connection between the WT and the PC, turn the WT OFF and then ON again.

How to Use This Manual

Structure of the Manual

This user's manual consists of the following sections.

Chapter	Title	Description
1	Product Overview	Explains the software's features and the details of its applicable standards.
2	Preparation before Use	Explains how to connect the WT3000 to a PC and how to install this software.
3	Starting and Using the Software	Explains how to start the software and describes the main window.
4.	Using the Start and Exit Pages	Explains how to select a test schedule menu and how to close the software.
5	Using the Open Page to Load Measured Data and Setting Information	Explains how to load setting information and measured data.
6	Using the Connection Page to Establish a Connection between the PC and a WT	Explains how to establish a connection between the WT3000 and a PC.
7	Using the Setting Page to Configure Measurement and Judgment Conditions	Explains how to set general test conditions.
8	Using the Measure Page to Make Measurementsa	Explains how to execute a compliance test.
9	Using the Analysis Page to Display Judgment Results and Measured Data	Explains how to display judgment results and measured data.
10	Using the Print Page to Print Reports	Explains how to print a report.
11	Using the Save Page to Save Setting Information and Measured Data	Explains how to save setting information and measured data.
12	Other Features	Explains how to arrange windows, use the help function, and display the software's version information.
13	Troubleshooting	Lists various error messages.
14	Specifications	Lists the specifications of the software.
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Software Versions That This Manual Applies To

This manual applies to IEC 61000-3-2-compliant WT3000 Harmonic Measurement Software versions 6.01 or later. If you are using an older version, you will not be able to use all of the features described in this manual. The software version is displayed in the upper right of this software's window. For details, see section 12.4.

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1.1 Explanation of Functions

This software application (761922) measures the harmonics of electrical equipment according to the IEC Standard (see section 1.3 for an overview) and indicates/saves the results of judgments made according to the standard.

Applicable Measurement Instruments

This software can be used with YOKOGAWA's measurement instruments listed below. This user's manual (IM761922-06E) describes the case when this software is used in combination with the WT3000. For information about the handling precautions, functions, and operating procedures of the WT3000 (hereinafter referred to as the WT), see the respective manuals.

Product Model
WT3000 760301, 760302, 760303, and 760304

Applicable Standard

For the applicable standards, see section 1.3.

Setting Up Test Schedule Menus

You can arrange the following steps as you like to create test schedule menus.



Start: Select and edit test schedule menus.



Open: Load measured data and WT setting information files.



Connection: Configure the connection between the PC and a WT.



Setting: Set compatibility and measurement conditions.



Measure: Measure voltage fluctuation and flicker.



Analysis: Display measured results as bar and trend graphs.



Print: Print screen images and reports.



Save: Save measured data and setting information files.



Exit: Close the software.

1.1 Explanation of Functions

You can start this software and then operate it according to the order of one of the test schedule menus. By designing appropriate menus, you can make the testing process smoother. You can also avoid forgetting and skipping steps when you have to repeat the same process over and over again.

Here are more details about each step:

Start



Select and edit test schedule menus. There are four preset standard menus available in addition to custom menus that you can make yourself (located under the “User Setting” option button).

Open



Loading Setting Information

You can load setting information files that contain information such as the measurement mode, bar graph and list display formats, standard and measurement settings, the measurement time, and report titles and comments (reports contain information such as judgment results and lists and graphs of measured data values).

Loading Measured Data and Waveform Data

You can load the harmonic measurement data, waveform data, harmonic measurement conditions, and setting information that have been saved to a file.

Connection



Use to connect the PC on which this software is installed to a WT through a GP-IB or Ethernet interface.

Setting



Standard and Measurement Settings

You can set judgment conditions according to the IEC 61000-3-2 or JIS standard.

Setting the Measurement Time

The measurement time is the time between the start of the measurement to the end of the measurement. The time for measuring harmonics is set in units of 1 s in advance. The harmonics can be measured continuously for the specified time. The measurement time can be changed when equipment that emits harmonics that fluctuate over time is measured or when confirming that the emitted harmonics do not change even when the equipment is operated over extended time.

Edition Settings for IEC 61000-4-7

IEC 61000-4-7 specifies requirements for measurement instruments. You can set the IEC 61000-4-7 edition to 1.0, 2.0 or 2.0 A1. This setting affects the window function (measurement period) of the WT.

Edition No. of the IEC61000-4-7	Window Function of the WT3000 (Measurement Period)	
	50Hz	60Hz
Edition 1.0	16 cycles (320 ms)	16 cycles (267 ms)
Edition 2.0	10 cycles (200 ms)	12 cycles (200 ms)
A1 of the Edition 2.0	10 cycles (200 ms)	12 cycles (200 ms)

For more details, see chapter 14.

Measure

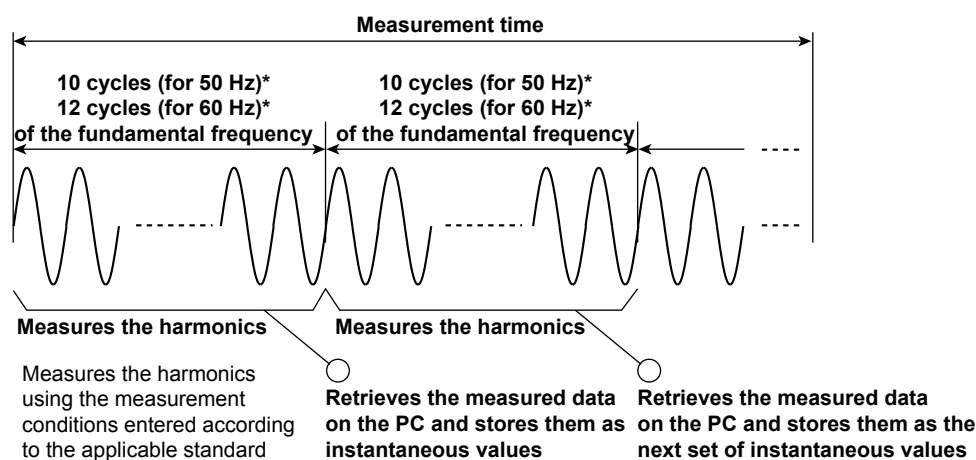


There are two measurement modes that you can select from the Measure submenu: Compliance test and Test preview. The software acquires different types of data and performs different operations for each measurement mode.

Compliance Test

• When in On-Line Mode

Measurement and evaluation of harmonics conforming to IEC 61000-3-2 or JIS can be made while making harmonic measurements on the WT



One set of harmonic measurement data (handled as instantaneous values by the software) consists of harmonic data measured every 200 ms (10 cycles for 50 Hz and 12 cycles for 60 Hz)*. The instantaneous values, the mean value, and the maximum value of the measured data retrieved within the measurement time (see next page) can be evaluated to determine whether they are within the limits of the standard.

* For when the IEC 61000-4-7 edition is set to 2.0 or 2.0 A1. When the IEC 61000-4-7 edition is set to 1.0, the number of cycles is 16 (320 ms at 50 Hz or 267 ms at 60 Hz).

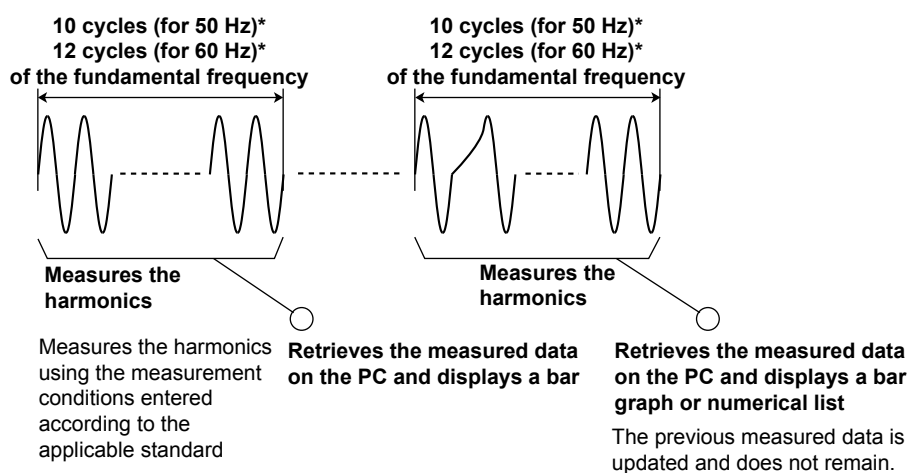
- **When in Off-Line Mode**

Evaluation can be made on the loaded measurement data according to the method complying with IEC 61000-3-2 or JIS.

Test Preview

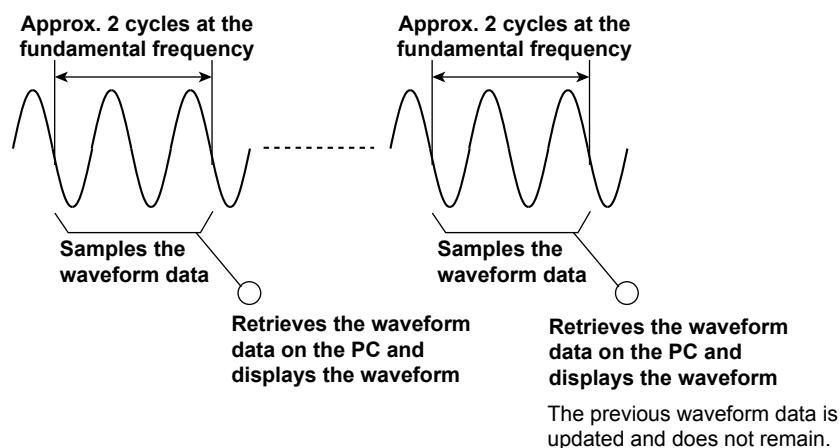
You can only select Test preview in online mode. As the WT measures the harmonic current, you can observe the harmonic fluctuations as they appear on a list and bar graphs of measured values. You can also observe the measured waveform. Unlike the compliance test, the harmonic preview is only for observing the state of a harmonic current. It does not determine whether or not a device conforms to certain standards. New data replaces old data. The software only retains the most recently acquired values.

- **Test Preview, List Preview, Bar Preview**



* For when the IEC 61000-4-7 edition is set to 2.0 or 2.0 A1. When the IEC 61000-4-7 edition is set to 1.0, the number of cycles is 16 (320 ms at 50 Hz or 267 ms at 60 Hz).

- **Waveform Preview**



Starting/Stopping Measurements

Harmonic measurement on the WT can be started from your PC when in On-Line mode. The measurement cannot be started when in Off-Line mode.

- **Compliance Test**

After you start WT harmonic current analysis from your PC, the PC will acquire and save the values that the WT measures. All of the data that is acquired during the specified measurement time is saved. After the specified measurement time is reached, the PC will automatically end measurement and data acquisition. You can also stop data acquisition from the PC before the measurement time is reached.

- **Test Preview**

After you start WT harmonic current analysis from your PC, the PC will acquire the values that the WT measures. New data replaces old data. The software only retains the most recently acquired data. Unlike the compliance test, the test preview is only for observing the state of a harmonic current. It does not determine whether or not a device conforms to certain standards.

Analysis



The result of the evaluation as to whether the harmonic current data up to order 40 is within the limits of IEC 61000-3-2 or JIS and the corresponding measured data can be displayed.

Display of the Evaluation Result within the Entire Measurement Time

Evaluation can be made as to whether all of the harmonic measurement data in the measurement time are within the limits according to the settings specified in "Setting the Standard and Measurement Environment" (as described earlier), and the results can be displayed collectively.

List and Bar Graph Display of Harmonic Current

A list and bar graphs of the harmonic measurement data and the standard limits can be displayed for each order. Moreover, the evaluation as to whether harmonic current data is within the limits can be displayed using different colors. The harmonic current data to be evaluated is the mean value, the maximum value, and instantaneous values (one set of harmonic measurement data) of the measured data within the measured time. Harmonic current can be displayed for each input element of the WT.

Bar Graph Display of Harmonic Voltage, Current, and Phase Angle

You can display the measured data for each harmonic in a bar graph. The software will display the instantaneous values in the bar graph (instantaneous values are the values that are acquired at each measurement of the harmonic current).

List Display of Harmonic Voltage, Current, and Phase Angle

You can display the measured data for each harmonic in a list. The software will display the instantaneous values in the list (instantaneous values are the values that are acquired at each measurement of the harmonic current).

Trend Graph Display of Harmonic Measurements

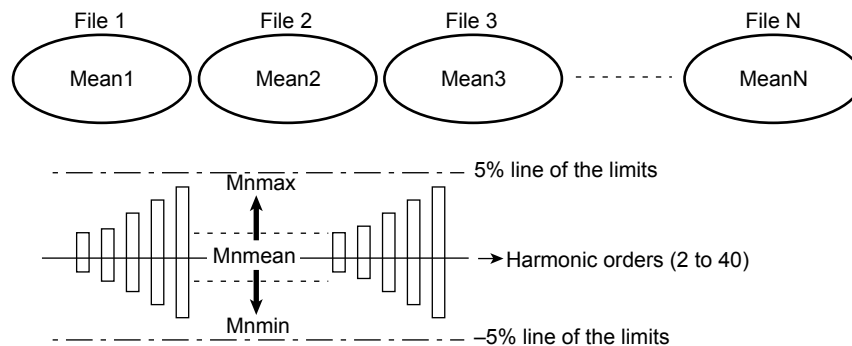
For each harmonic, you can use a trend graph to show how the harmonic measurement data fluctuates over time.

Waveform Display of Voltage and Current

You can display a waveform that is measured immediately after the measurement time finishes. The software will display approximately two waveform periods. You can click on an area to display a cursor and show the instantaneous values there.

Repeatability of Measured Data

The mean value in the harmonics measurement data saved to files can be compared, and the difference in the measured data can be displayed on a bar graph or numerical list for each order. This function can be used to evaluate whether the difference between data measured under the same measurement conditions when harmonics are measured using the same product or same product model is within 5% of the limits (confirmation of repeatability).



$$\mathbf{Mnmean = (Mean1 + Mean2 + Mean3 + \dots + MeanN)/N}$$

(Mnmean: The value derived by summing the mean values of each file (Mean1, Mean2, Mean3, ... MeanN) and dividing by the number of summed values (N). The value can be determined for each order.)

$$\mathbf{Mnmax = [Mean1, Mean2, Mean3, \dots, MeanN]max}$$

(Mnmax: The maximum value among the mean values of each file. The value can be determined for each order.)

$$\mathbf{Mnmin = [Mean1, Mean2, Mean3, \dots, MeanN]min}$$

(Mnmin: The minimum value among the mean values of each file. The value can be determined for each order.)

Print



To create reports, you can attach titles and comments to harmonic measurement data lists and bar graphs and then save them to .bmp files or print them.

Save



Saving Setting Information

You can save setting information, such as measurement settings, measurement time, bar graph and list display formats, and report titles and comments, to an .ini file (reports contain information such as judgment results and lists and graphs of measured data values).

Saving Measured Data and Waveform Data

The software can save the measured data and waveform data that it acquires from the WT to an .fdt file. When the software saves this data, it will also save the WT harmonic measurement conditions along with the setting information described above to an .ini file.

Saving Measured Data and Waveform Data to CSV Format

You can use this software to save the harmonic measurement data and waveform data that the PC has acquired from the WT to a CSV file. This software cannot load CSV files, but you can use another program on the PC to load and view the CSV files that you save.

Exit



Use to close the software.

Online Mode and Offline Mode

Online Mode

The software is in online mode when the PC is connected to the WT through a GP-IB or Ethernet interface. The software must be in online mode to acquire harmonic data from the WT as the data is being measured. You can switch to Online mode from the Connection page. In online mode, you can change the WT settings from the PC.

Offline Mode

You can load previously saved harmonic measurement data into the software. You can change the settings and reanalyze the loaded data, and you can display a variety of lists and graphs.

1.2 PC System Requirements

PC

CPU

Pentium IV 1.5 GHz or equivalent or faster.

Memory

512 MB or more

Hard Disk

Free space of at least 2 GB.

Operating System

Windows 2000 Professional, Windows XP Home Edition, or Windows XP Professional.

Communication Card

GP-IB

PCI-GPIB/PCI-GPIB+/PCMCIA-GPIB/PCMCIA-GPIB+/PCIe-GPIB by National Instruments with NI-488.2 driver version 1.60 or later (however, version 2.3 is not supported).

Ethernet

A 100BASE-TX Ethernet port.

Display, Printer, and Mouse

Must be compatible with the operating systems listed above.

WT3000

The WT3000 must be equipped with the following:

- Advanced calculation feature (/G6 option)
- GP-IB interface (standard) or Ethernet interface (/C7 option)

How Different WT3000 Firmware Versions Handle IEC 61000-4-7

In WT3000 firmware versions 4.11 and later, you can select the IEC 61000-4-7 edition from one of the following three choices:

- Ed. 1.0
- Ed. 2.0
- Ed. 2.0 A1

IEC 61000-4-7 specifies requirements for measurement instruments. For details, see chapter 14. In WT3000 firmware versions 4.01 to 4.10, the edition is fixed at 2.0.

Note

To upgrade the firmware on your WT3000, contact your nearest YOKOGAWA dealer.

1.3 Applicable Standards

This software supports the following standards:

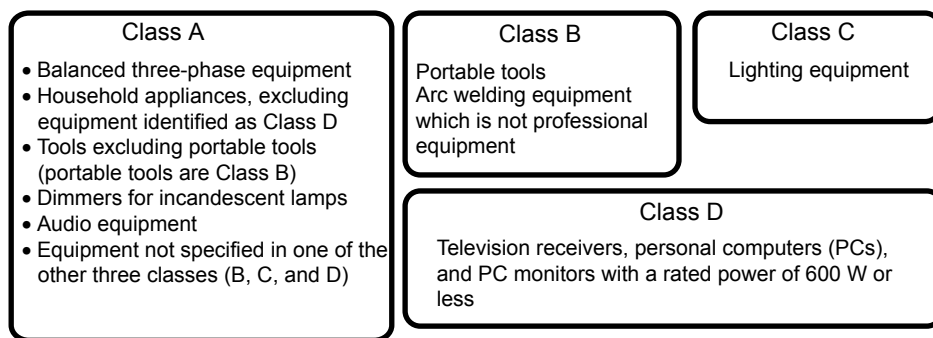
- The IEC 61000-3-2(Electromagnetic compatibility (EMC) - Part 3-2: Limits - Limits for harmonic current emissions (equipment input current ≤ 16 A per phase)) Edition 3.0 and A1 of the Edition 3.0
- EN61000-3-2 (2006)
- IEC61000-4-7 Edition 1.0, Edition 2.0 and A1 of the Edition 2.0
- JIS C61000-3-2 (2005) JIS: Japanese Industrial Standard

This section gives an overview of the standards. For further details, see the actual text of the applicable standard.

Scope and Classification

The limits for harmonic current emissions (IEC61000-3-2 or JIS) are applicable to electrical and electronic equipment having an input current of up to 16 A (up to 20 A for JIS) per phase and connected to public low-voltage distribution systems. Classification is made depending on the type of equipment. IEC 61000-3-2 Edition 3.0 does not define the limits for some types of equipment. For details, see the applicable standard.

—Electrical and electronic equipment having an input current up to 16 A per phase —



Limits

The limits are specified for each class. IEC 61000-3-2 assumes a phase voltage of 220 V, 230 V, and 240 V for specifying the limits. For equipment of differing rated voltage, conversion may be necessary. For the conversion equation, see “Conversion of Limits” (page 1-11). The limits of JIS C-61000-3-2(2005) are the same as those of IEC61000-3-2. However, limits indicated on the next page apply to air conditioners of class A whose active power exceeds 600 W.

Limits for Class B Equipment

Harmonic order n	Maximum permissible harmonic current [A]
Odd harmonics	
3	2.30
5	1.14
7	0.77
9	0.40
11	0.33
13	0.21
$15 \leq n \leq 39$	$0.15 \times (15/n)$
Even harmonics	
2	1.08
4	0.43
6	0.30
$8 \leq n \leq 40$	$0.23 \times (8/n)$

1.3 Applicable Standards

In JIS C61000-3-2(2005), the limits below apply to air conditioners whose active power exceeds 600 W.

Harmonic order n	Maximum permissible harmonic current [A]
Odd harmonics	
3	$2.30+0.00283(W-600)$
5	$1.14+0.00070(W-600)$
7	$0.77+0.00083(W-600)$
9	$0.40+0.00033(W-600)$
11	$0.33+0.00025(W-600)$
13	$0.21+0.00022(W-600)$
$15 \leq n \leq 39$	$(0.15+0.00020(W-600)) \times (15/n)$
Even harmonics	
2	$1.08+0.00033(W-600)$
4	$0.43+0.00017(W-600)$
6	$0.30+0.00012(W-600)$
$8 \leq n \leq 40$	$(0.23+0.00009(W-600)) \times (8/n)$

Limits for Class B Equipment

Limits for Class A equipment $\times 1.5$

Limits for Class C Equipment

Classification is made according to the active power of the equipment shown below. For single-phase equipment, the classification is made using the active power of the single-phase power. For multi-phase equipment, the classification is made using the sum of the active powers all phases (three phases if three-phase).

- **Equipment with active input power exceeding 25 W**

Harmonic order n	Maximum permissible harmonic current expressed as a percentage of the input current at the fundamental frequency [%]
2	2
3	$30 \times \lambda^*$
5	10
7	7
9	5
$11 \leq n \leq 39$ (Odd harmonics only)	3

* λ is the power factor (circuit power factor).

For the fundamental current and power factor, use the measured values under maximum load conditions of the equipment.

- **Equipment with active input power less than or equal to 25 W**

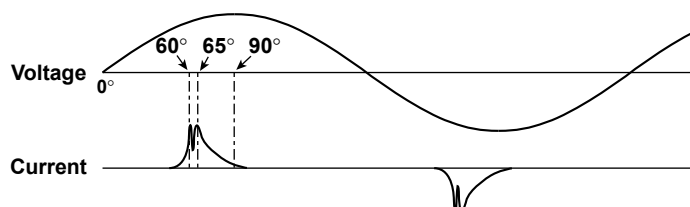
Shall meet one of the two conditions below.

1. Does not exceed the power ratio limits of Class D.
2. The third and fifth harmonics shall not exceed the limits given in the table below.
Moreover, the relationship of the fundamental voltage waveform and the input current waveform shall be as shown in the figure below.

Harmonic order n	Maximum permissible harmonic current expressed as a percentage of the input current at the fundamental frequency [%]
3	86
5	61

The relationship of the fundamental supply voltage waveform and the input current waveform is as follows, where the zero crossing of the fundamental supply voltage is assumed to be at 0° (degrees).

- Beginning of the current flow: Before or at 60°
- Last current peak: Before or at 65°
- End of the current flow: 90° or after



Limits for Class D Equipment

Shall meet the maximum permissible harmonic current (power ratio limit) per watt and the maximum permissible current given in the next table. The concept of power (active power) of single- or multi-phase equipment is the same as Class C.

Harmonic order n	Maximum permissible harmonic current per watt [mA/W] (Power ratio limit)	Maximum permissible harmonic current (Odd harmonics only) [A]
3	3.4	2.30
5	1.9	1.14
7	1.0	0.77
9	0.5	0.43
11	0.35	0.33
$13 \leq n \leq 39$ (Odd harmonics only)	$3.85/n$	Same as class A.

Conversion of Limits

IEC 61000-3-2 assumes a phase voltage of 220 V, 230 V, and 240 V for specifying the limits. For equipment of differing rated voltage, conversion may be necessary. Convert the limits of all the classes using the following equations and apply them. However, conversion to a phase voltage of 220 V or 240 V is not necessary.

Phase voltage

$$\text{Converted limit} = \text{Limit of each class} \times \frac{230}{\text{Rated voltage of the equipment}}$$

Line voltage of three-phase

$$\text{Converted limit} = \text{Limit of each class} \times \frac{400}{\text{Rated voltage of the equipment}}$$

Specifications of Supply Source, Measurement Equipment, Test Conditions, and Application Method of Limits.

This section lists only the items. For detailed specifications, see the applicable standard.

Power Supply

- Supply voltage and frequency range.
- Permissible range of harmonics contained in the supply voltage.
- Voltage peak value and phase offset between the waveform zero crossing and the peak value.
- Internal impedance of the supply source.
- Angle between the fundamental voltage on each pair of phases in the case of a three-phase source.

Measurement Equipment

- Error of the measurement equipment.
- Input impedance of the measurement equipment.
- Time constant of the internal processing when measuring harmonics.

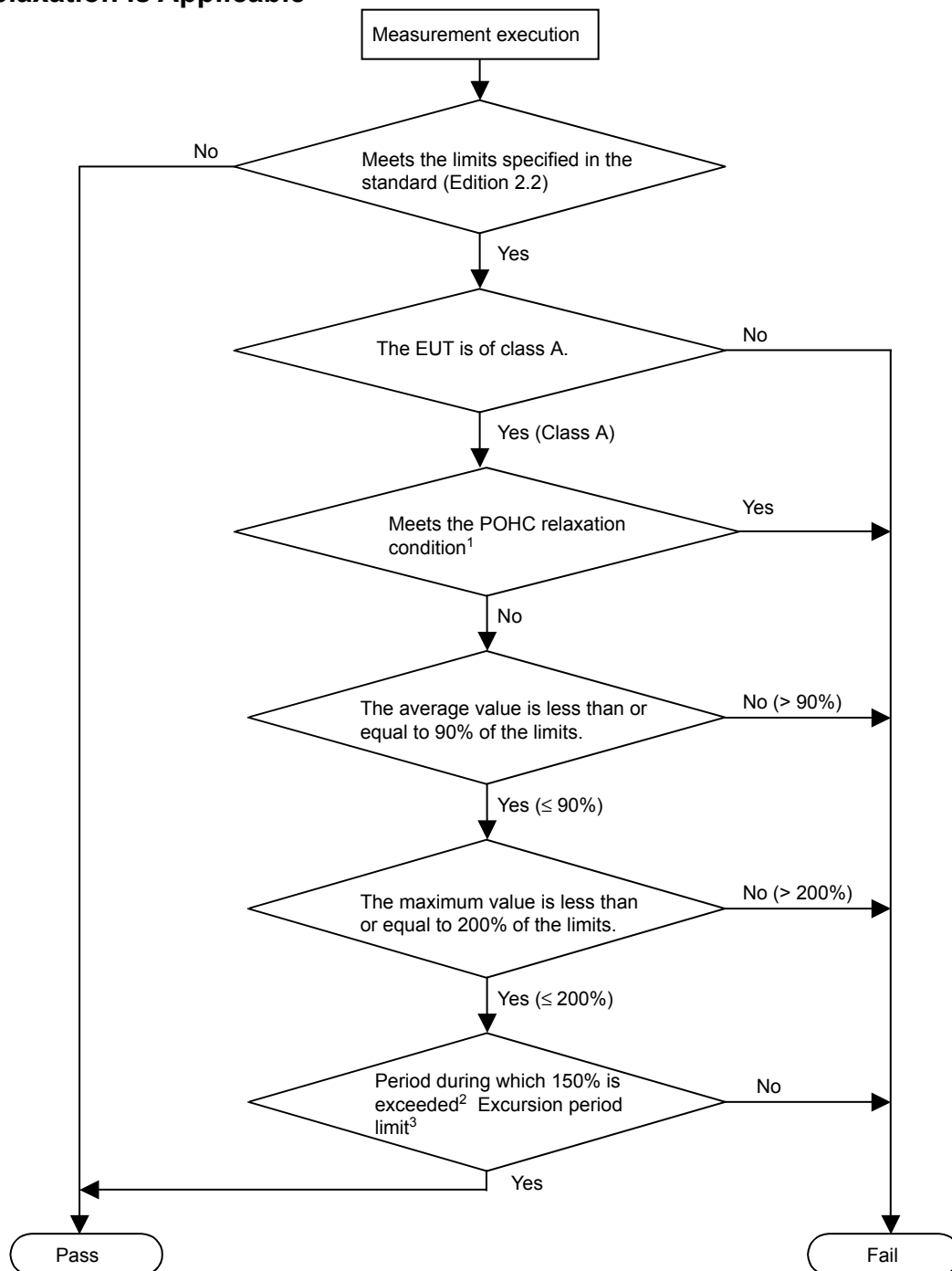
Test Conditions

- Test conditions for television/audio equipment and lighting equipment.
- Test conditions for general equipment not specified in the applicable standard.
For example, performing tests by setting the equipment to a condition that produces the maximum total harmonic current (THC).
- Specification of the repeatability of the measurement results.
- Specification of the observation time (measurement time) to achieve the repeatability of the measurement results.

Application Method of Limits

- Derivation of the fundamental current and power factor (circuit power factor) of class C equipment.
- Derivation of the power (active power) used by class D equipment
- Specifications when comparing the harmonic current limits and measured values for each order.
 - Compare the specified limit and the mean value of the harmonic current within the measurement time and evaluate.
 - Compare the value that is 1.5 times the specified limit and the maximum value of the harmonic current within the measurement time and evaluate.
- 200% short-term relaxation conditions
If all of the following conditions are met for each order, up to 200% of the specified limits is permitted.
 - The EUT belongs to Class A for harmonics.
 - The excursion beyond 150 % of the applicable limits lasts less than 10 % of the test observation period or in total 10 min (within the test observation period), whichever is smaller.
 - The average value of the harmonic current, taken over the entire test observation period, is less than 90 % of the applicable limits.
- POHC relaxation of the specification
If the total partial odd harmonic currents (POHC) of order above and including 21 is less than the specified POHC limit, the average of the odd harmonic currents of order above and including 21 is permitted to be 1.5 times the specified limits.

Decision Process for Determining Whether 200% Short-Term Relaxation or POHC Relaxation Is Applicable



¹ The 200% short-term relaxation and POHC relaxation cannot be applied together to a single test.

² Period during which instantaneous values exceed 150% of the applicable limit.

³ 10% of the test observation period or 10 minutes (within the test observation period), whichever is smaller.

Window Function of the WT3000 (Measurement Period)

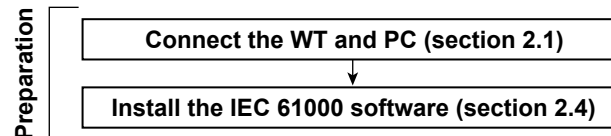
The width of the window function (measurement period) for the measurements is defined by IEC61000-4-7. For details, see page 1-3 or chapter 14.

1.4 Flow of Operation

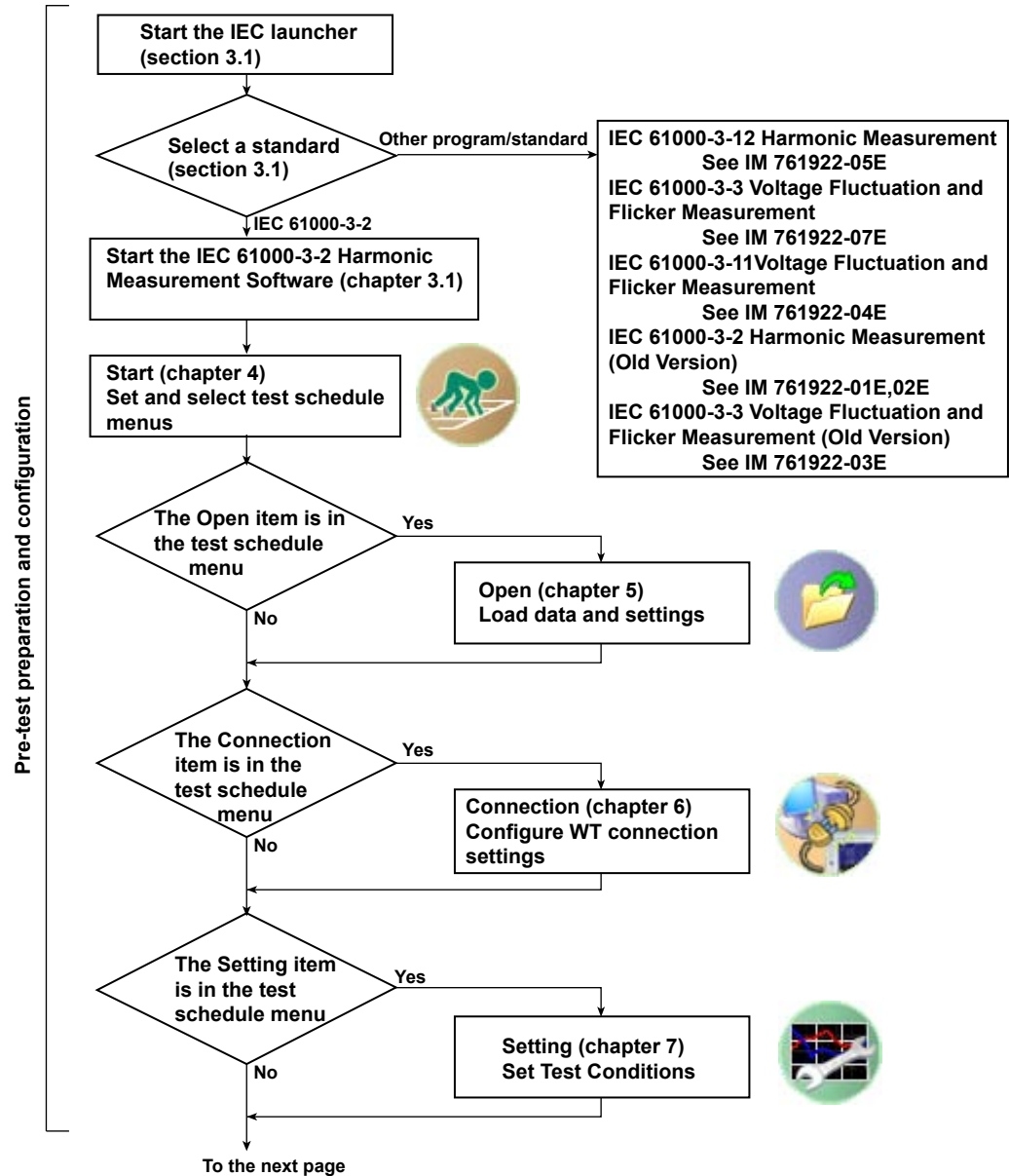
To display and judge harmonic measurement data using this software, the WT and PC must be connected, the software must be installed, WT measurement conditions must be set, and judgment conditions of the applicable standard must be set. Follow the steps below.

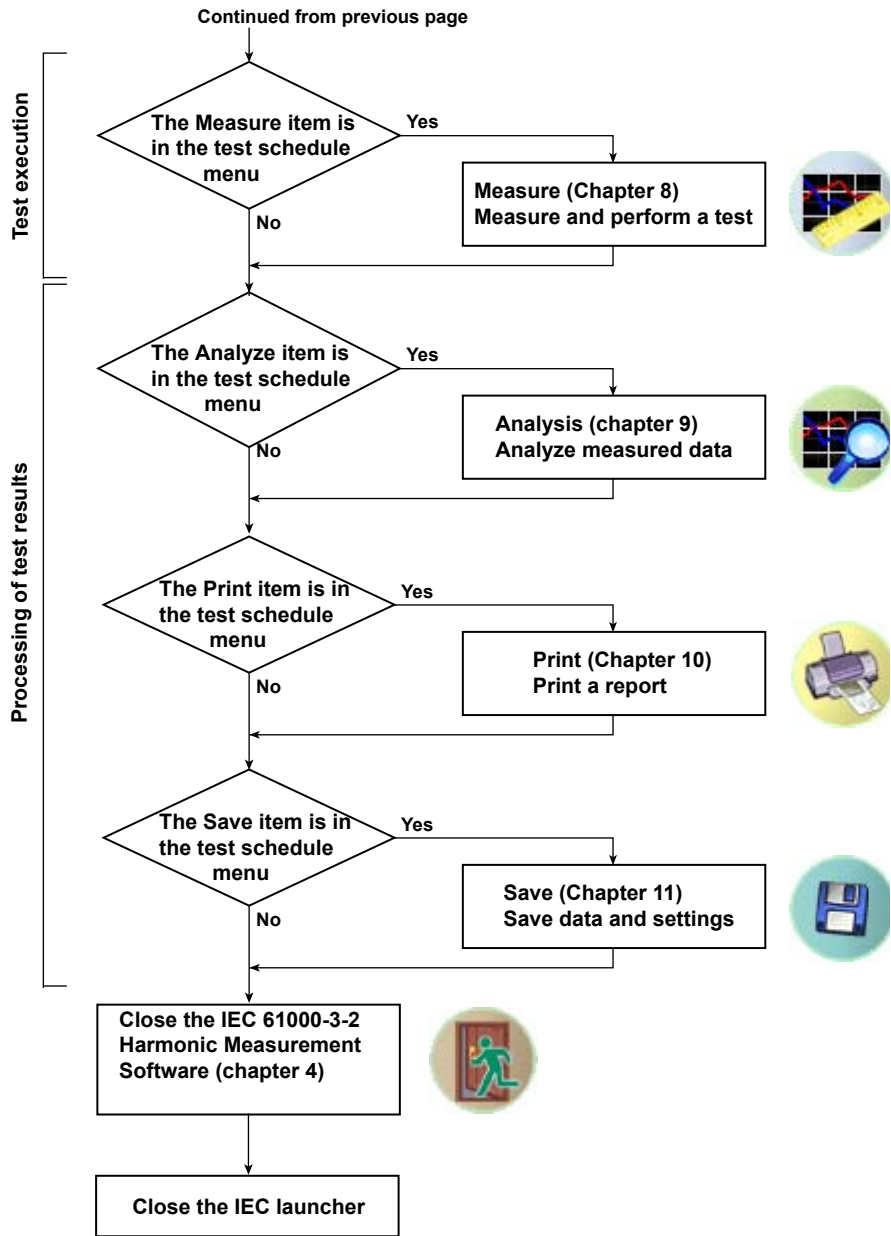
There are two methods for connecting the PC and the WT: GP-IB and Ethernet (option).

Preparation Flow Chart



Test Flowchart





1.5 Terminology Related to Harmonics

Harmonics refer to sine waves whose frequency is an integer multiple of the fundamental wave (normally sine waves of commercial frequency 50-Hz or 60-Hz) excluding the fundamental frequency.

Fundamental Wave (Fundamental Component)

The sine wave with the longest period among the different sine waves derived from the periodic complex wave. Or the sine wave that has the fundamental frequency within the components of the complex wave.

Fundamental Frequency

The frequency corresponding to the longest period in the periodic complex wave. The frequency of the fundamental wave.

Distorted Wave

A wave that differs from the fundamental wave.

Higher Harmonic

A sine wave with frequency that is an integer multiple (twice or greater) of the fundamental frequency.

Harmonic Component

Waveform component with frequency that is an integer multiple (twice or greater) of the fundamental frequency.

Harmonic Order

Integer ratio of the harmonic frequency with respect to the fundamental frequency. IEC defines the maximum harmonic order that is measured to be 40.

PLL Source

When measuring harmonics, the fundamental period (period of the fundamental signal) must be determined in order to analyze the higher orders. The PLL (Phase Locked Loop) source is the signal that is used to determine the fundamental period.

THC (Total Harmonic Component)

Sum (rs value) of harmonic currents of orders 2 to 40.

$$\sqrt{\sum_{k=2}^{40} I(k)^2}$$

$I(k)$: rms current of each order
 k : harmonic order

THD (Total Harmonic Distortion)

The ratio of the rms value of all harmonics of orders 2 to 40 and the rms value of the fundamental wave.

• V THD

$$\frac{\sqrt{\sum_{k=2}^{40} U(k)^2}}{U(1)} \times 100$$

• A THD

$$\frac{\sqrt{\sum_{k=2}^{40} I(k)^2}}{I(1)} \times 100$$

• P THD

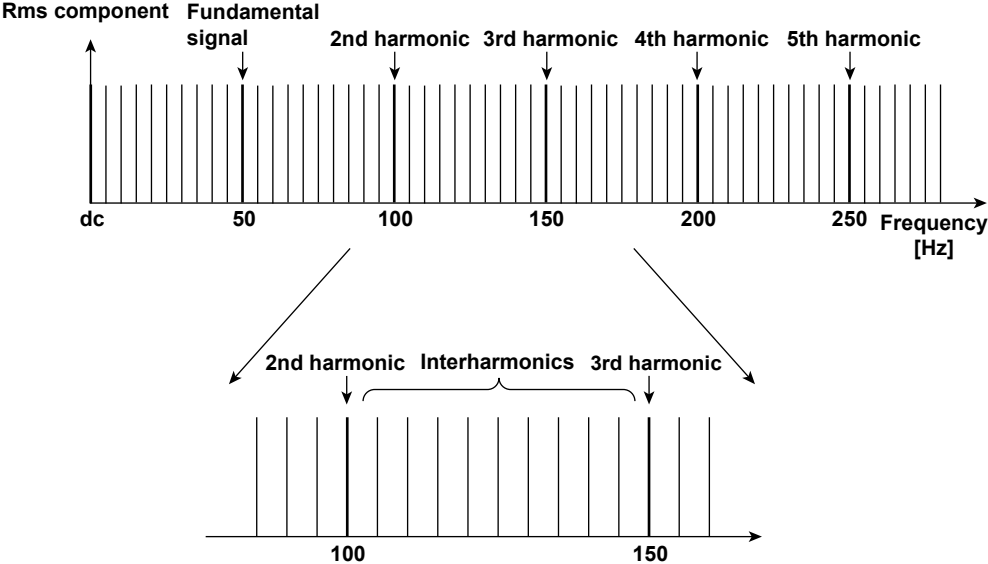
$$\left| \frac{\sum_{k=2}^{40} P(k)}{P(1)} \right| \times 100$$

$U(k)$: rms voltage of each order, $U(1)$: rms voltage of the fundamental signal
 $I(k)$: rms current of each order, $I(1)$: rms current of the fundamental signal
 $P(k)$: active power of each order, $P(1)$: active power of the fundamental signal
 k : harmonic order

Interharmonics

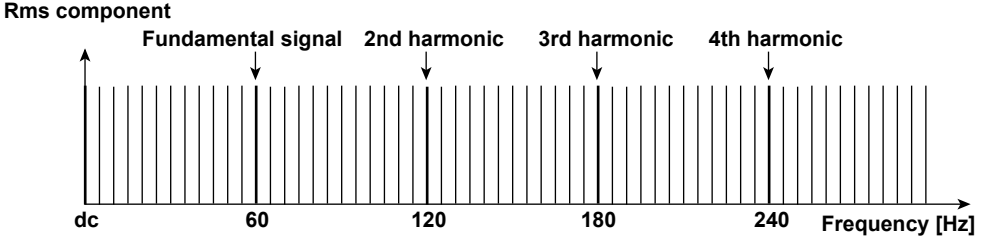
If the input signal is 50 Hz in IEC harmonic measurement, Fourier transform is taken on 10 periods of the input signal to derive frequency components of 5-Hz resolution. Thus, the section between each harmonic order is divided into 10 frequency components. The components between each harmonic order are called interharmonics.

When the fundamental signal is 50 Hz



If the input signal is 60 Hz, 12 periods of the input waveform are divided into frequency components of 5-Hz resolution. Thus, the section between each harmonic order is divided into 12 frequency components.

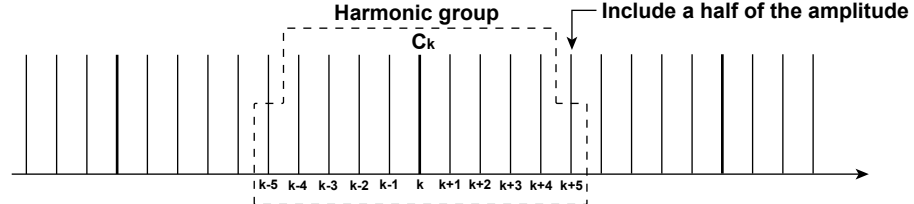
When the fundamental signal is 60 Hz



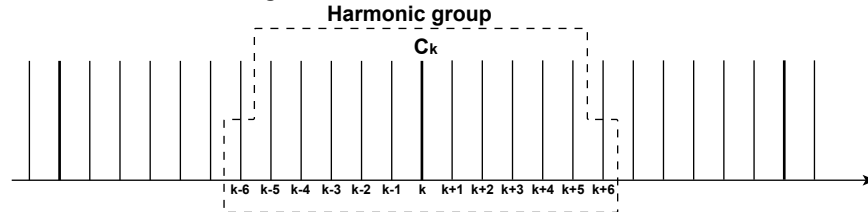
Harmonic Group

The combined value of a harmonic and its adjacent interharmonics (rms value). The computing method to combine the harmonic and its two adjacent interharmonics is not simple addition, but the square root of the sum of the square of each component. A half of the amplitude is included for the interharmonic that is in the middle of two harmonics.

When the fundamental signal is 50 Hz



When the fundamental signal is 60 Hz



$$G_{g, n} = \sqrt{\frac{C_{k-5}^2}{2} + \sum_{i=-4}^4 C_{k+i}^2 + \frac{C_{k+5}^2}{2}} \quad (\text{for 50 Hz})$$

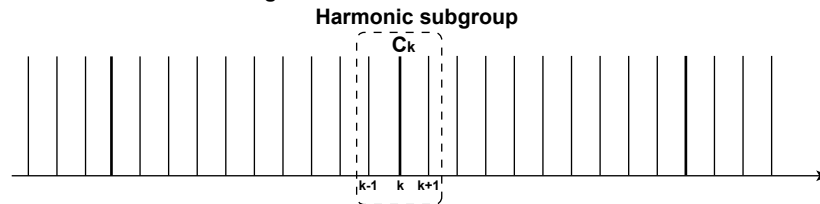
$$G_{g, n} = \sqrt{\frac{C_{k-6}^2}{2} + \sum_{i=-5}^5 C_{k+i}^2 + \frac{C_{k+6}^2}{2}} \quad (\text{for 60 Hz})$$

C_k: frequency component for every 5 kHz

Harmonic Subgroup

The combined value (rms value) of a harmonic and its two adjacent interharmonics. The computing method to combine the components is the average of the sum of the squares as with the harmonic group.

When the fundamental signal is 50 Hz



$$G_{sg, n} = \sqrt{\sum_{i=-1}^1 C_{k+i}^2}$$

C_k: frequency component for every 5 kHz

THDG (Group Total Harmonic Distortion)

The ratio of the sum of all harmonic groups of orders 2 to 40 with respect to the group related to the fundamental wave.

• V THDG

$$\frac{\sqrt{\sum_{k=2}^{40} U_g(k)^2}}{U_g(1)} \times 100$$

• A THDG

$$\frac{\sqrt{\sum_{k=2}^{40} I_g(k)^2}}{I_g(1)} \times 100$$

U_g(k), I_g(k): rms value of the harmonic group of each order
k: harmonic order

THDS (Subgroup Total Harmonic Distortion)

The ratio of the sum of all harmonic sub groups of orders 2 to 40 with respect to the sub group related to the fundamental wave.

• **V THDS**

$$\frac{\sqrt{\sum_{k=2}^{40} U_{sg}(k)^2}}{U_{sg}(1)} \times 100$$

• **A THDS**

$$\frac{\sqrt{\sum_{k=2}^{40} I_{sg}(k)^2}}{I_{sg}(1)} \times 100$$

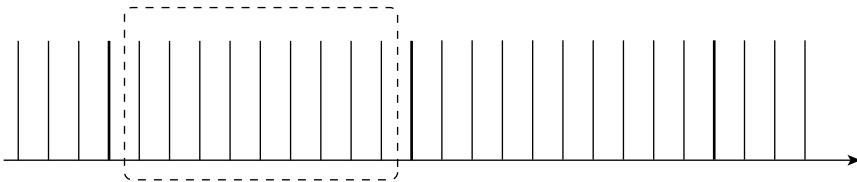
$U_{sg}(k)$, $I_{sg}(k)$: rms value of the harmonic subgroup of each order
k: harmonic order

Interharmonic Group

The combined value (rms value) of all interharmonic components between two consecutive harmonic frequencies.

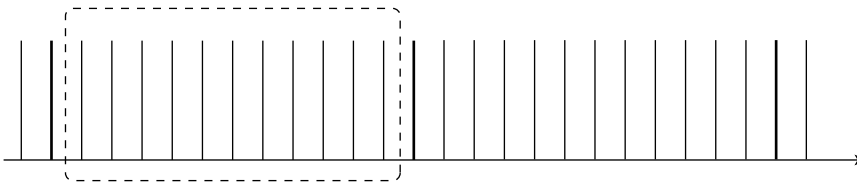
When the fundamental signal is 50 Hz

Interharmonic group



When the fundamental signal is 60 Hz

Interharmonic group

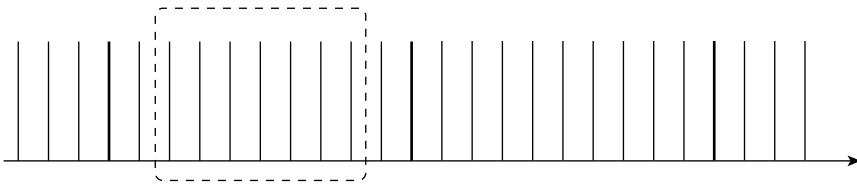


Interharmonic Center Subgroup

The combined value (rms value) of all interharmonic components between two consecutive harmonic frequencies excluding the frequency components adjacent to the harmonic frequencies.

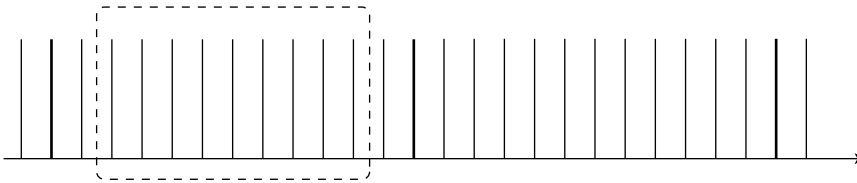
When the fundamental signal is 50 Hz

Interharmonic center subgroup



When the fundamental signal is 60 Hz

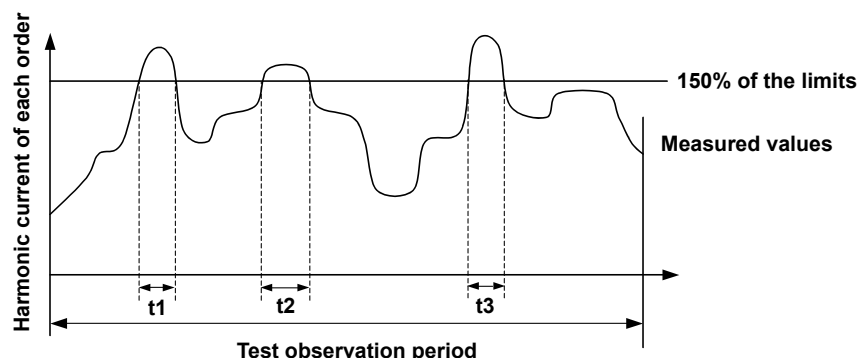
Interharmonic center subgroup



1.5 Terminology Related to Harmonics

200% Short-Term Relaxation

Calculating the period during which 150% of the applicable limit is exceeded and determining whether or not the relaxation condition applies



When the test observation period is less than 100 minutes

$$t_1 + t_2 + t_3 \times 10\% \text{ of the test observation period}$$

When the test observation period is greater than or equal to 100 minutes

$$t_1 + t_2 + t_3 < 10 \text{ minutes}$$

POHC: The combined value of all odd harmonic currents greater than or equal to order 21 (Partial Odd Harmonic Current)

$$\sqrt{\sum_{k=21, 23}^{39} I(k)^2}$$

$I(k)$: rms current of odd harmonics above and including order 21

k : harmonic order, odd value above and including 21

PoHC Maximum: The maximum value of the combined value of all odd harmonic currents greater than or equal to order 21

The POHC maximum derived from individual measured data points within the measurement time. If this value is less than the POHC Limit below, the relaxation condition (see page 1-12) is applied.

POHC Limit

$$\sqrt{\sum_{k=21, 23}^{39} I_L(k)^2}$$

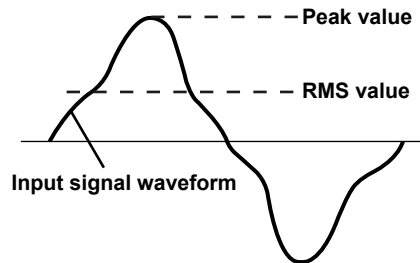
$I_L(k)$: limits of odd harmonics above and including 21 as specified by the applicable standard

k : harmonic order, odd value above and including 21

Crest Factor

The crest factor is defined as the ratio of the peak value of the waveform to the rms value.

$$\text{Crest factor (CF)} = \frac{\text{Peak value}}{\text{RMS value}}$$



The crest factor on the WT is determined by the maximum peak value that can be applied for rated input in terms of a multiplication factor.

$$\text{Crest factor (CF)} = \frac{\text{Peak value that can be input}}{\text{Measurement range}}$$

You can select a crest factor of 3 or 6 on the WT3000. For details on the measurement accuracy and crest factor of the IEC standard, see chapter 14, "Specifications." Highly accurate measurements can be performed by setting the crest factor to 3.

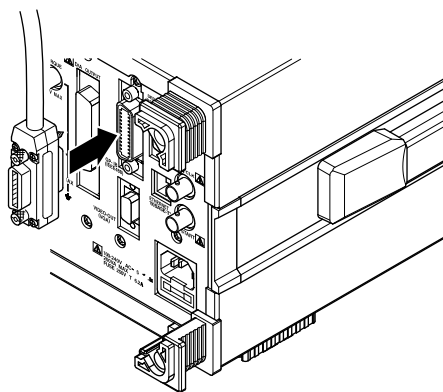
2.1 Connecting the WT and the PC

CAUTION

When connecting or disconnecting communication cables, make sure to turn OFF the PC and the WT. Otherwise, erroneous operation or damage to the internal circuitry may result.

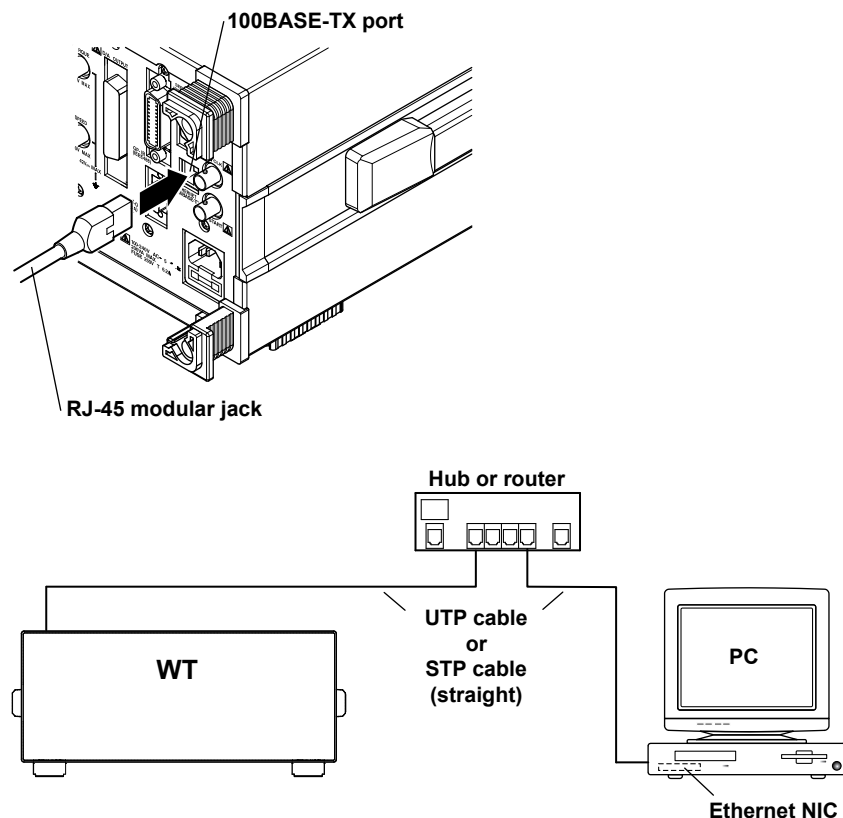
When Controlling the WT through the GP-IB

The GP-IB available on the WT is a 24-pin connector that conforms to the IEEE St'd 488-1978. Use a GP-IB cable that conforms to this standard. Connect the cable to the GP-IB connector on the rear panel of the WT. For details on the connection procedure and the specifications of the GP-IB interface, see the *WT3000 Communication Interface User's Manual IM760301-17E* on the CD-ROM. Use an appropriate connector for your PC to connect the other end of the GP-IB cable.



When Controlling the WT through the Ethernet Interface

Connect the WT and your PC through a hub using straight UTP (Unshielded Twisted-Pair) or STP (Shielded Twisted-Pair) cables. Connect the cable to the ETHERNET port on the rear panel of the WT. Use hubs, cables, and Ethernet NIC that are appropriate for the data rate. For details on the connection procedure and the specifications of the Ethernet interface, see the *Expansion Function User's Manual IM760301-51E* of the WT3000 and the *WT3000 Communication Interface User's Manual IM760301-17E* on the CD-ROM.



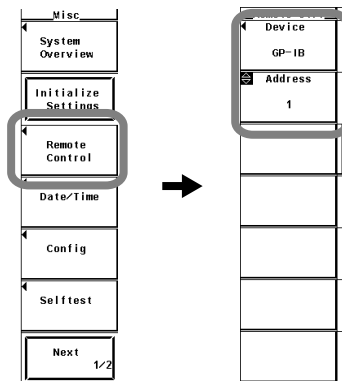
Note

- Use UTP (Unshielded Twisted-Pair) or STP (Shielded Twisted-Pair) cables of category 5 or better when connecting to a 100BASE-TX network.
 - Do not directly connect the WT to the PC without using a hub. Operations are not guaranteed for communications using direct connection.
-

2.2 Setting the GP-IB Control

Procedure

1. Press **MISC** to display the Misc menu.
2. Press the **Remote Control** soft key to display the Remote Ctrl menu.
3. Press the **Device** soft key to select GP-IB.
Only the communication interface selected here is enabled. The WT does not accept commands that are transmitted to other unselected communication interfaces.
4. Press the **cursor keys** to set the address.



Explanation

To use the software in On-Line mode through the GP-IB interface, operate the WT to select GP-IB.

Setting the Address

Set the WT address within the following range.

1 to 30

Each device that can be connected via GP-IB has a unique address within the GP-IB system. This address is used to distinguish the device from others. Therefore, make sure that the WT address does not overlap with other devices when connecting the WT to the PC.

Note

- Do not change the address while the controller (PC) or other devices are using the GP-IB system.
 - When connecting the WT to a single PC and controlling the WT using this software, multiple communication interfaces cannot be used simultaneously.
 - Use a GP-IB card by National Instruments on the PC end. For details, see section 1.2.
 - The software may not operate correctly, if an adapter is inserted in the middle of the connection between the WT and the PC (for example, GP-IB-to-USB adapter). For details, contact your nearest YOKOGAWA dealer.
-

2.3 Setting the Ethernet Control

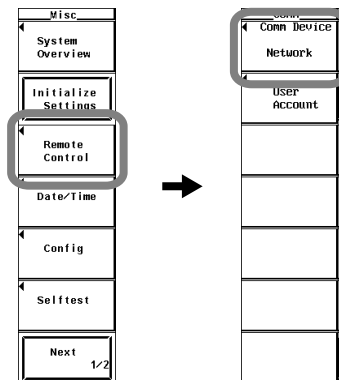
Procedure

2

Preparation before Use

Setting the Ethernet Interface

1. Press **MISC** to display the Misc menu.
2. Press the **Remote Control** soft key to display the Remote Ctrl menu.
3. Press the **Device** soft key to select Network.
Only the communication interface selected here is enabled. The WT does not accept commands that are transmitted to other unselected communication interfaces.

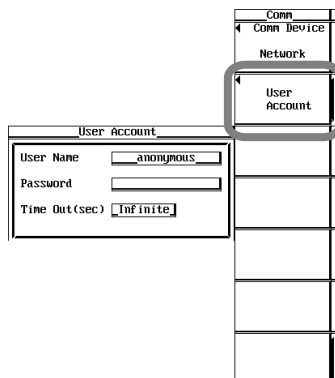


Setting the User Name and Password

4. Press the **User Account** soft key to display the User Account dialog box.
5. Press the **cursor keys** to select User Name.
6. Press **SET** to display the keyboard.
7. Use the **keyboard** on the WT to enter the user name.
For the keyboard operation of the WT, see the WT User's Manual.
8. Press the **cursor keys** to select Password.
9. Press **SET** to display the keyboard.
10. Use the **keyboard** on the WT to enter the password.
Enter the password twice for confirmation.
A password is not required if the login name is anonymous.
For the keyboard operation of the WT, see the WT User's Manual.

Setting the Timeout Value

11. Press the **cursor keys** to select Time Out.
12. Press **SET** to display the timeout time selection box.
13. Press the **cursor keys** to set the timeout value.
14. Press **SET** or **ESC** to close the box.



Setting TCP/IP

You must enter TCP/IP settings to control the WT from a PC through the network. For the setup procedure, see the *Expansion Function User's Manual IM760301-51E* of the WT3000.

Explanation

To use the software in On-Line mode through the network, operate the WT to select Network.

Setting the User Name

- Enter the user name to allow access to the WT.
- Enter up to 15 characters.
- The characters that can be used are 0-9, A-Z, %, _, () (parentheses), - (minus sign).
- If you specify anonymous, the WT can be accessed from the PC without a password.

Setting the Password

- Enter the password of the user name to allow access to the WT.
- Enter up to 15 characters.
- The characters that can be used are 0-9, A-Z, %, _, () (parentheses), - (minus sign).
- If you set the user name to anonymous, the WT can be accessed from the PC without a password.

Setting the Timeout Value

The WT closes the connection to the network if there is no access for a certain period of time (timeout value).

The available settings are 1 to 3600 s, or Infinite. The default value is Infinite.

Note

- To activate the settings, you must power cycle the WT.
- When connecting the WT to a single PC and controlling the WT using this software, multiple communication interfaces cannot be used simultaneously.
- The software may not operate correctly, if an adapter is inserted in the middle of the connection between the WT and the PC (for example, GP-IB-to-USB adapter). For details, contact your nearest YOKOGAWA dealer.

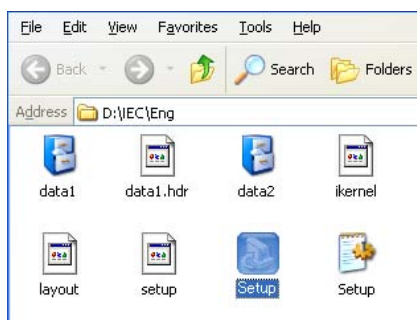
2.4 Installing the Software

Procedure

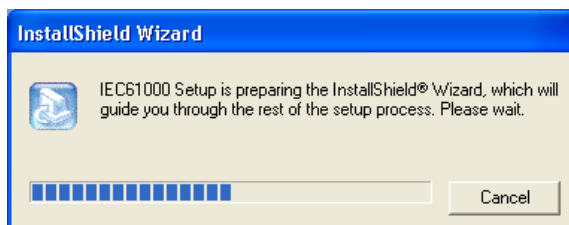
Have the CD-ROM containing the software ready. Exit all programs that are currently running before starting the installation. If an older version of the Harmonic/Flicker Measurement Software is installed, uninstall it first.

The following procedures are for installing the software on Windows 2000 Professional. The screens shown in the figure may vary depending on the OS that is running on the PC.

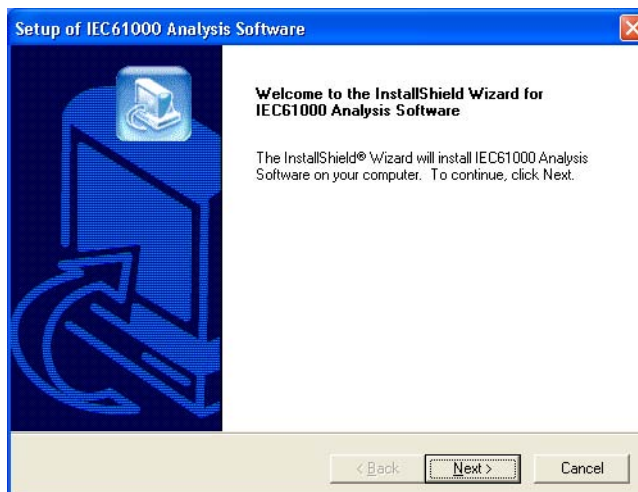
1. Start Windows.
When using Windows 2000, Windows XP Home Edition, or Windows XP Professional, set the user name to Administrator when starting up.
2. Place the installation CD-ROM containing the software into the CD-ROM drive.
3. Double-click My Computer, then the CD-ROM icon.
4. Double-click **Setup.exe**. InstallShield Wizard starts.



Startup window of the InstallShield Wizard

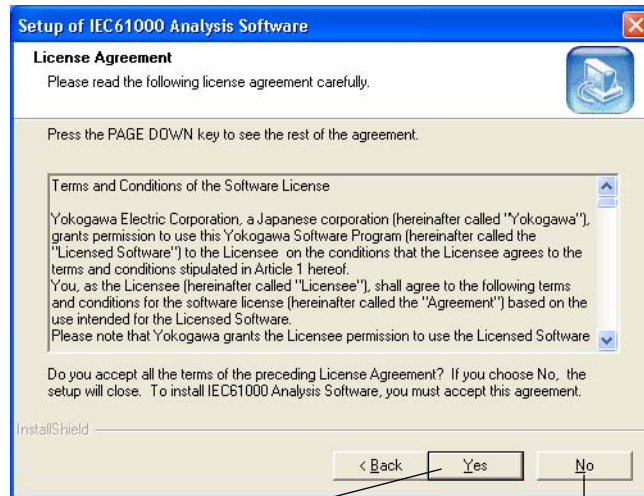


5. Click **Next**.



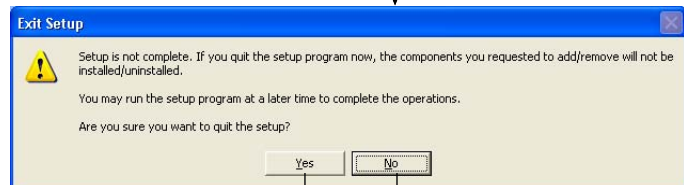
2.4 Installing the Software

6. If you accept the terms of with the license agreement, select **Yes**. If you do not, select **No**.



If you select "Yes," proceed to step 7.

If you select "No"

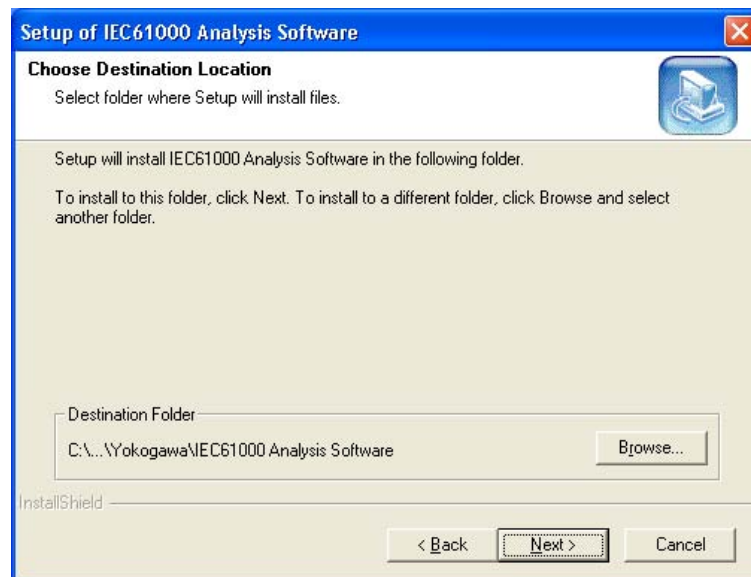


Abort the installation.

Return to the previous screen.

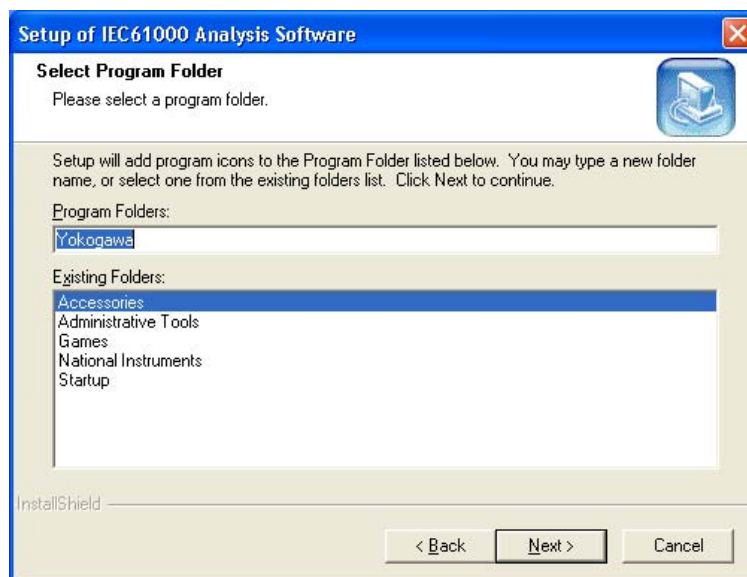
7. Select the installation destination, and click **Next**.

Click Browse to specify the installation destination. The default installation destination is set to "C:\Program Files\Yokogawa\IEC61000 Analysis Software."

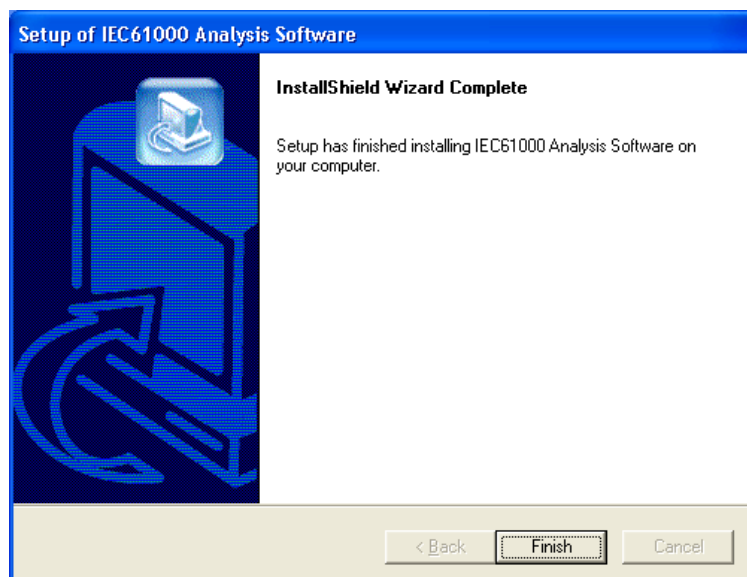


8. Select the program folder where the program icon is to be added and click **Next**. The installation starts.

The program icon (shortcut) of the software is added in the program menu of the Start menu. The destination is selected here. The default program folder is Yokogawa.



9. If the installation completes successfully, a message "Setup has finished installing" is displayed. Click **Finish**.



Uninstalling the Software

The procedure below is for uninstalling the software program on Windows XP.

1. On the task bar, click the Start button and choose Control Panel.
2. Double-click **Add or Remove Programs** from the Control Panel.
3. Select **IEC61000 Analysis Software** in the Add or Remove Programs window and click **Remove**.
4. A confirmation dialog box for removing the program opens. Click **Yes** to delete the program. Clicking **No** will cancel the removal operation.
5. The software program is uninstalled.

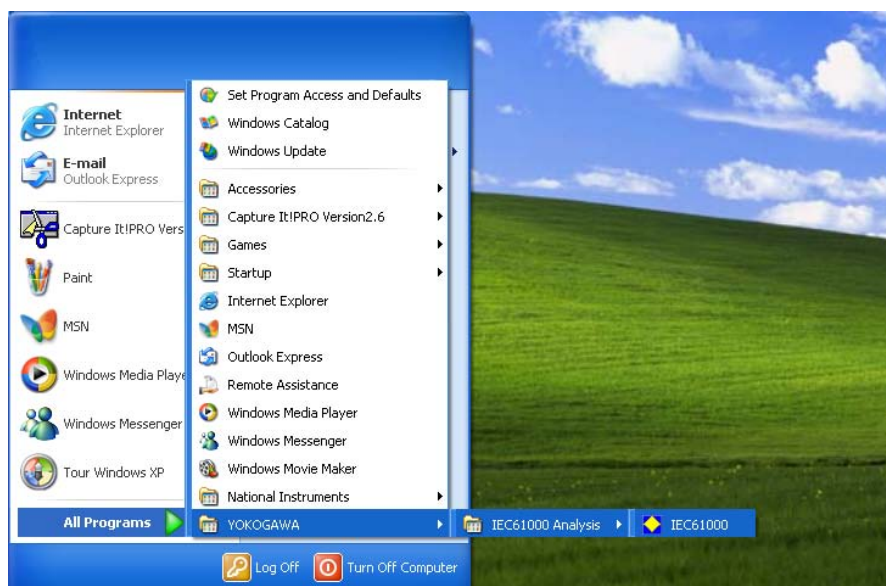
3.1 Starting the Software

Procedure

Starting the Software

1. From the **Start** menu, choose **All Programs > Yokogawa > IEC61000 Analysis > IEC61000**. The IEC 61000 software starts.

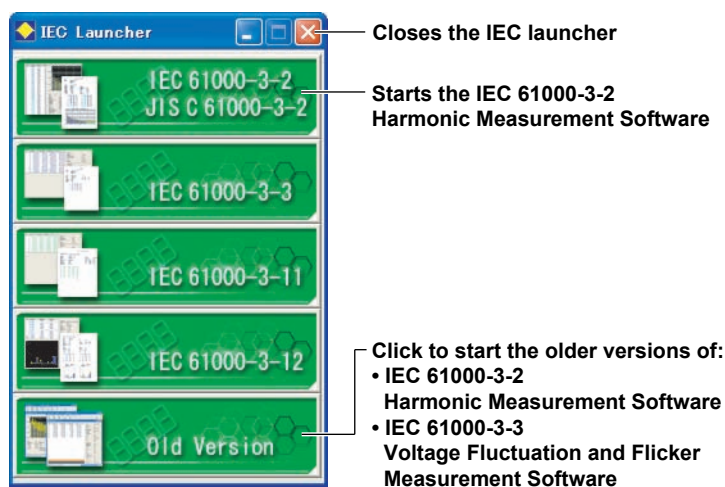
The procedure above applies when the default software installation destination and program folder are used. If you changed the installation destination or program folder at installation, select the corresponding location.



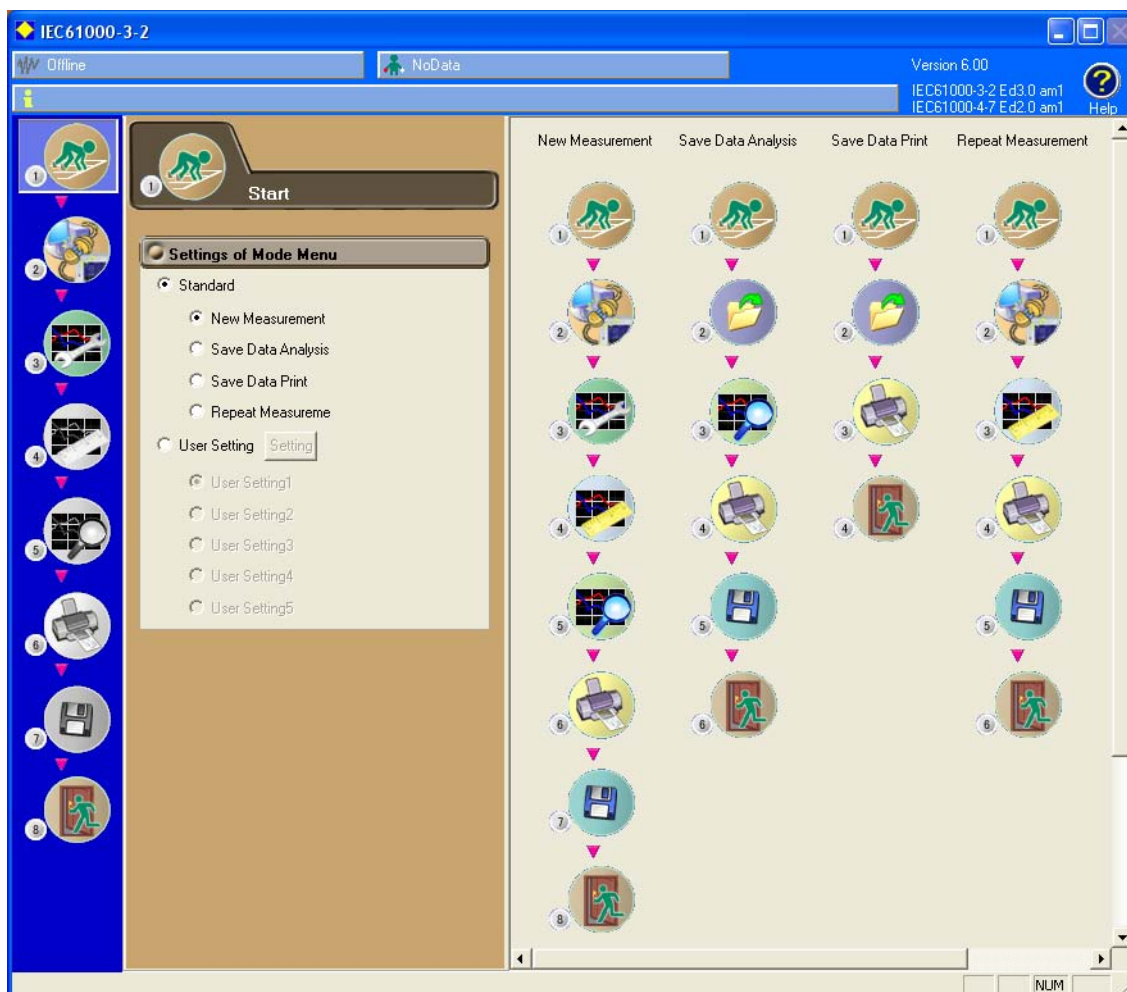
After you start the software, the IEC Launcher appears. Use it to select the appropriate standard.

Selecting a Standard

2. Select **IEC61000-3-2** to open the IEC 61000-3-2 Harmonic Measurement Software.



3.1 Starting the Software



Explanation

You can start this software by accessing its shortcut from the start menu's program folder. This software is installed in the location that you specified in the previous chapter.

Selecting a Standard

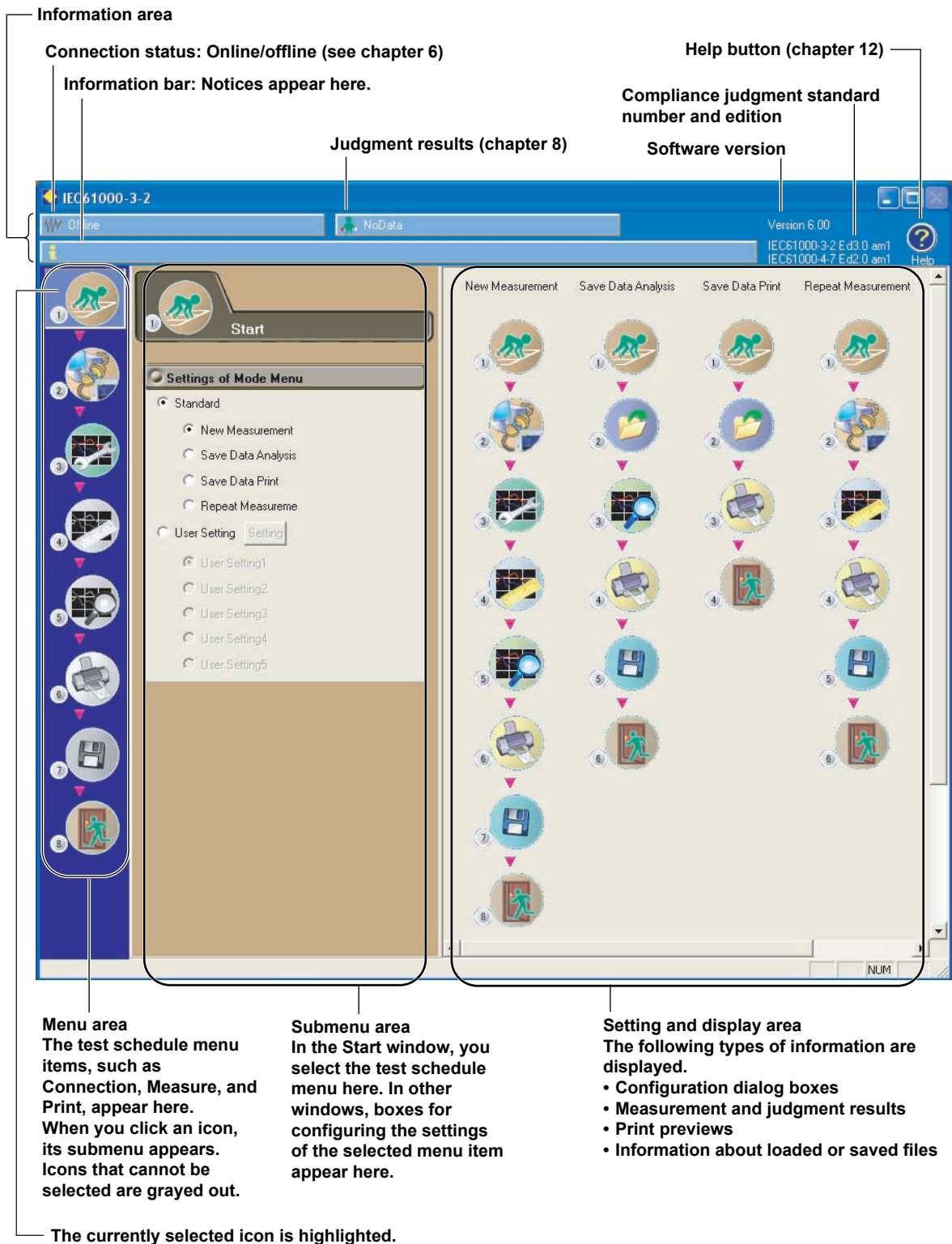
To analyze the harmonics of a device with an electric current not greater than 16 A, select IEC 61000-3-2. The Harmonic Measurement Software will start. If you select a different standard, the program that corresponds to that standard will start. For information about the programs that correspond to other standards, see their user's manuals (the help function, see section 12.3).

Note

You can start older versions (Ver. 5.xx) of the software by clicking on Old Version. These older versions have displays and menus that follow the old interface style. Also, they do not support the following standards:

- IEC61000-4-7 Edition 2.0 A1
- IEC61000-4-7 Edition 1.0

3.2 Basic Operations



Menu Area Icons



Start

Use to select and edit test schedule menus. There are four preset standard menus available, in addition to custom menus that you can make yourself (located under the "User Setting" option button).



Open

Use to open the following kinds of files:

- Setting information files that contain information such as measurement conditions and judgment conditions.
- Measured data files that contain measured data acquired by the PC from a WT.



Connection

Use to connect the PC to the WT through a GP-IB or Ethernet interface.



Setting

Use to set measurement and judgment conditions.



Measure

Use to measure harmonics. You can also preview test data.



Analysis

Use to display measured results using a variety of lists and graphs.



Print

You can attach comments and titles to a list of measured values and print the list as a report.



Save

Use to save the following kinds of files.

- Setting information files that contain information such as measurement conditions and judgment conditions.
- Measured data files that contain measured data acquired by the PC from a WT.
- CSV files that contain measured data and waveform data.



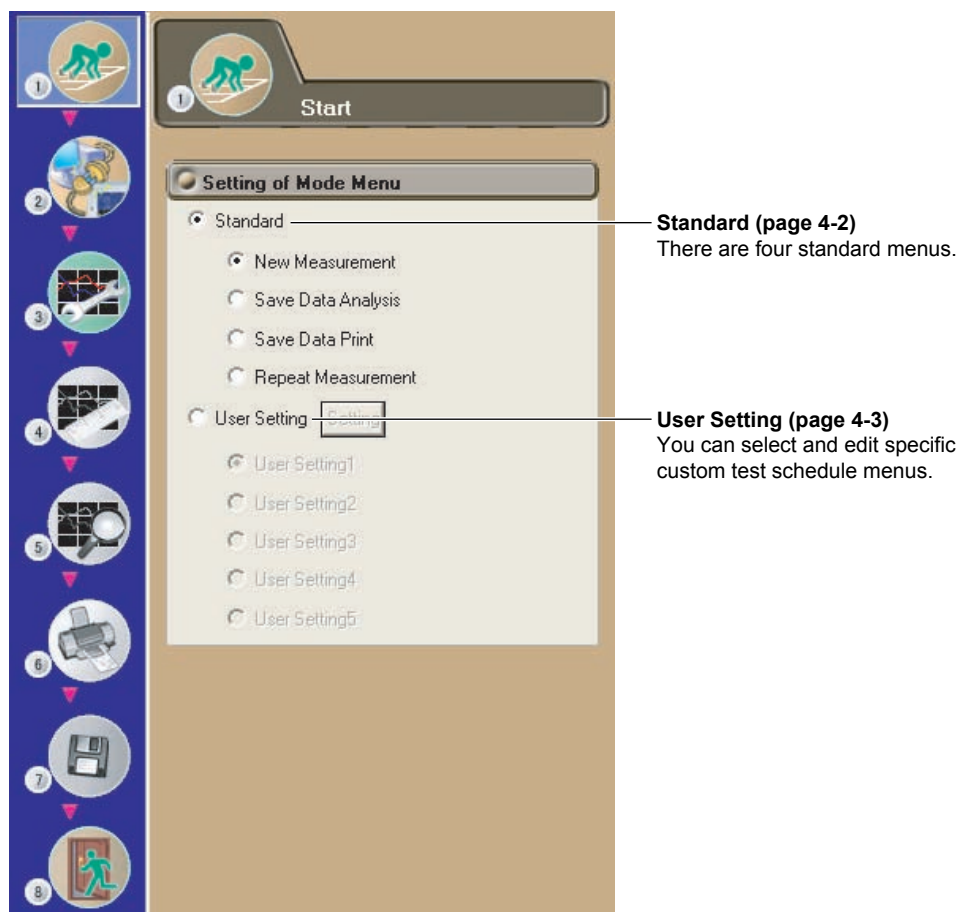
Exit

Use to close the software.

4.1 Selecting a Test Schedule Menu

Procedure

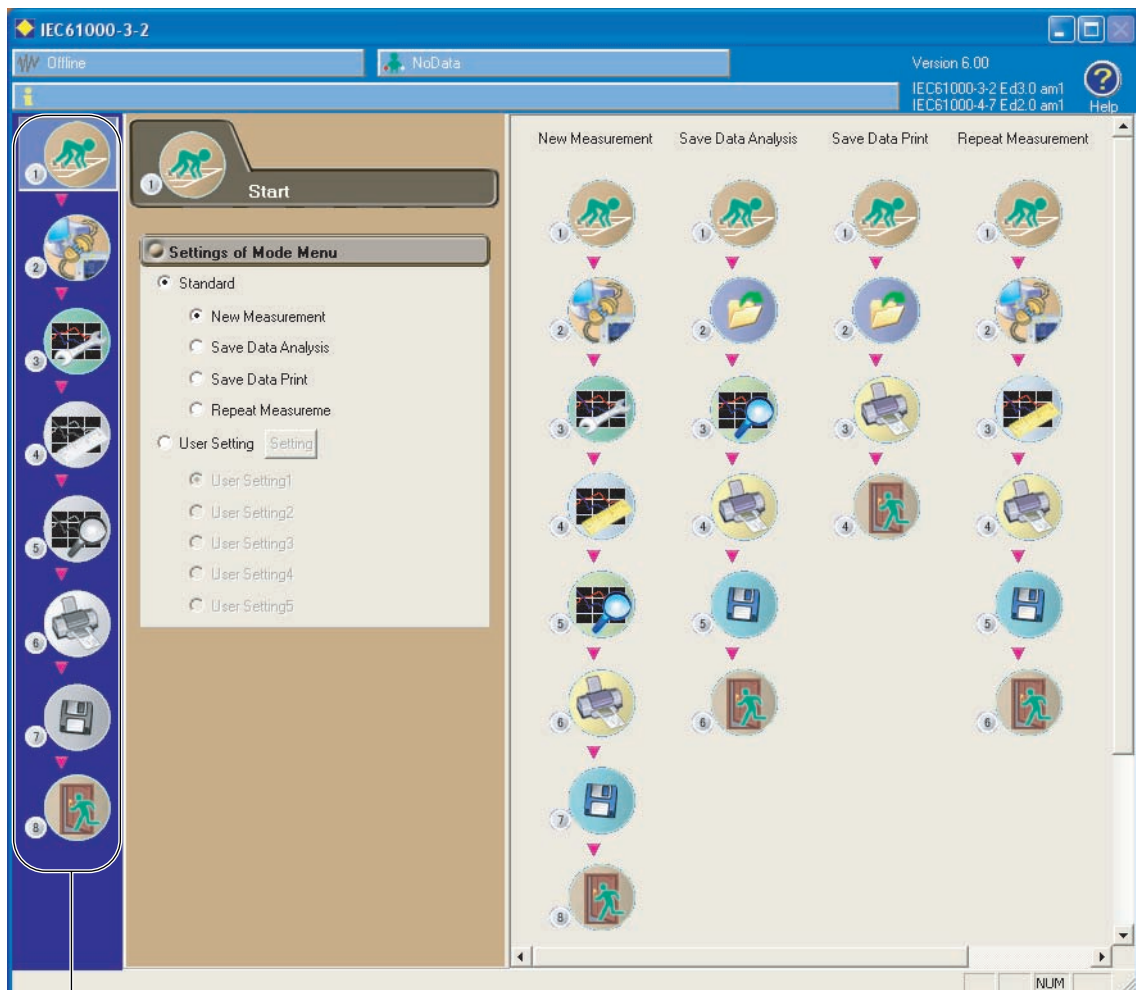
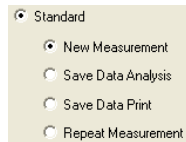
1. Select the  icon in the menu area. The Start submenu appears.



4.1 Selecting a Test Schedule Menu

Selecting One of the Standard Menus

2. Click **Standard**.
3. Select one of the following test schedule menus. The test schedule menu that you select will appear in the menu area on the left.
 - New Measurement
 - Save Data Analysis
 - Save Data Print
 - Repeat Measurement

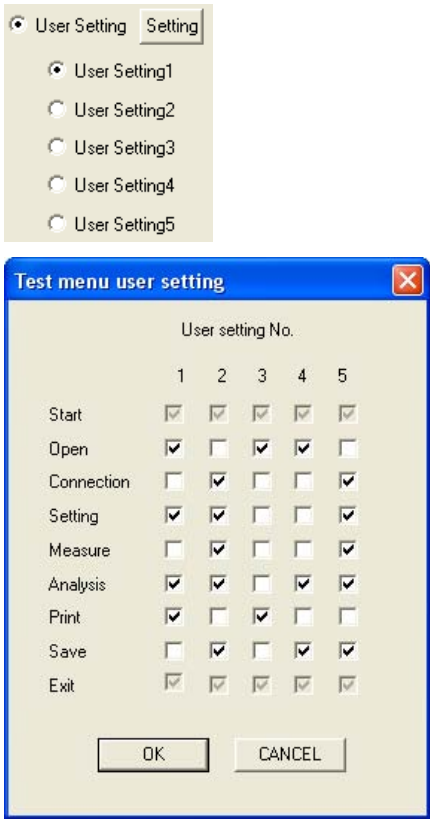


Menu area

The icons of the test schedule menu that you select appear.

Creating Your Own Custom Menu (User Setting)

- 2. Click **User Setting**.
- 3. Click **Setting**. The menu customization dialog box appears (the dialog box is labeled "Test menu user setting").
- 4. Use the check boxes to select the menu items that you want to include in each of the five custom menus (labeled as "User Setting" 1 to 5 in the start window).
- 5. Click **OK**.
- 6. Select the custom menu that you want to use from "User Setting" 1 to 5. The custom menu that you select will appear in the menu area on the left.



Explanation

Selecting a Test Schedule Menu

A test schedule menu lays out the overall test structure. You can choose from test schedule menus that contain different combinations of the following 9 steps. For more information on each step, see section 1.1.



Start: Select and edit test schedule menus.



Open: Load measured data and WT setting information files.



Connection: Configure the connection between the PC and a WT.



Setting: Set compatibility and measurement conditions.



Measure: Measure voltage fluctuation and flicker.



Analysis: Display measured results as bar and trend graphs.



Print: Print screen images and reports.



Save: Save measured data and setting information files.



Exit: Close the software.

Icon Display



Icon Number

This number indicates an icon's order in a menu.

Standard Menus

The following four standard menus are available.

- New Measurement: Set measurement and judgement conditions, make measurements, and then print and save the data.
- Save Data Analysis: Analyze, print, and save data that was measured and saved in the past.
- Save Data Print: Print data that was measured and saved in the past.
- Repeat Measurement: Make measurements with the same measurement and judgement conditions that you used for the previous measurement, and print and save data without analyzing it.

Setting Up Custom Menus

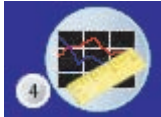
You can create custom test schedule menus by selecting what steps to include in them. You can create up to five different custom test schedule menus.

- Start and Exit steps are always selected. You cannot deselect them.
- The steps are arranged in the order that they appear in in the menu customization dialog box. You cannot change this order.

Icon Activation/Deactivation

Some icons cannot be selected out of order. These icons are grayed out.

Selectable (activated)



Not selectable (deactivated)



For example, the Measure icon cannot be selected when the Connection menu has been set such that the software is in offline mode. Icons such as Open, Connection, and Setting cannot be selected during measurement.

The following is a list of each icon and when it cannot be selected.

Start	During measurement
Open	During measurement
Connection	During measurement
Setting	During measurement
Measurement	When the software is in offline mode
Analysis	During measurement, or when there is no measured data to analyze
Print	During measurement, or when there is no measured data to print
Save	During measurement, or when there is no measured data to save
Exit	During measurement

Note

If you open the Start submenu while in online mode, the software will switch to offline mode.

4.2 Closing the Software

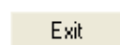
Procedure

1. Select the  icon in the menu area. The Exit submenu appears.



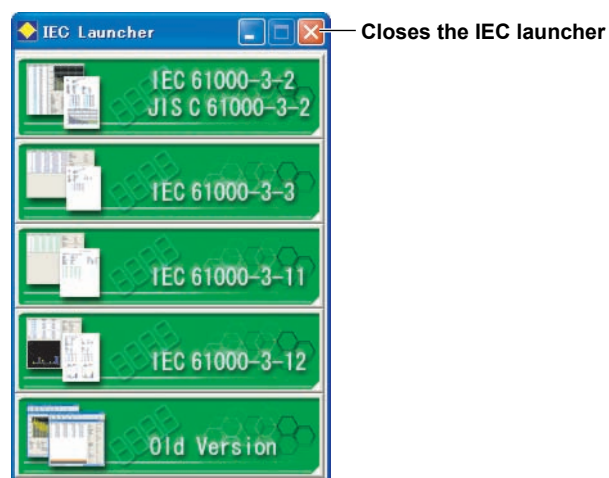
Closing the IEC 61000-3-2 Harmonic Measurement Software

2. Click **Exit**. The software closes.



Closing the IEC61000 Launcher

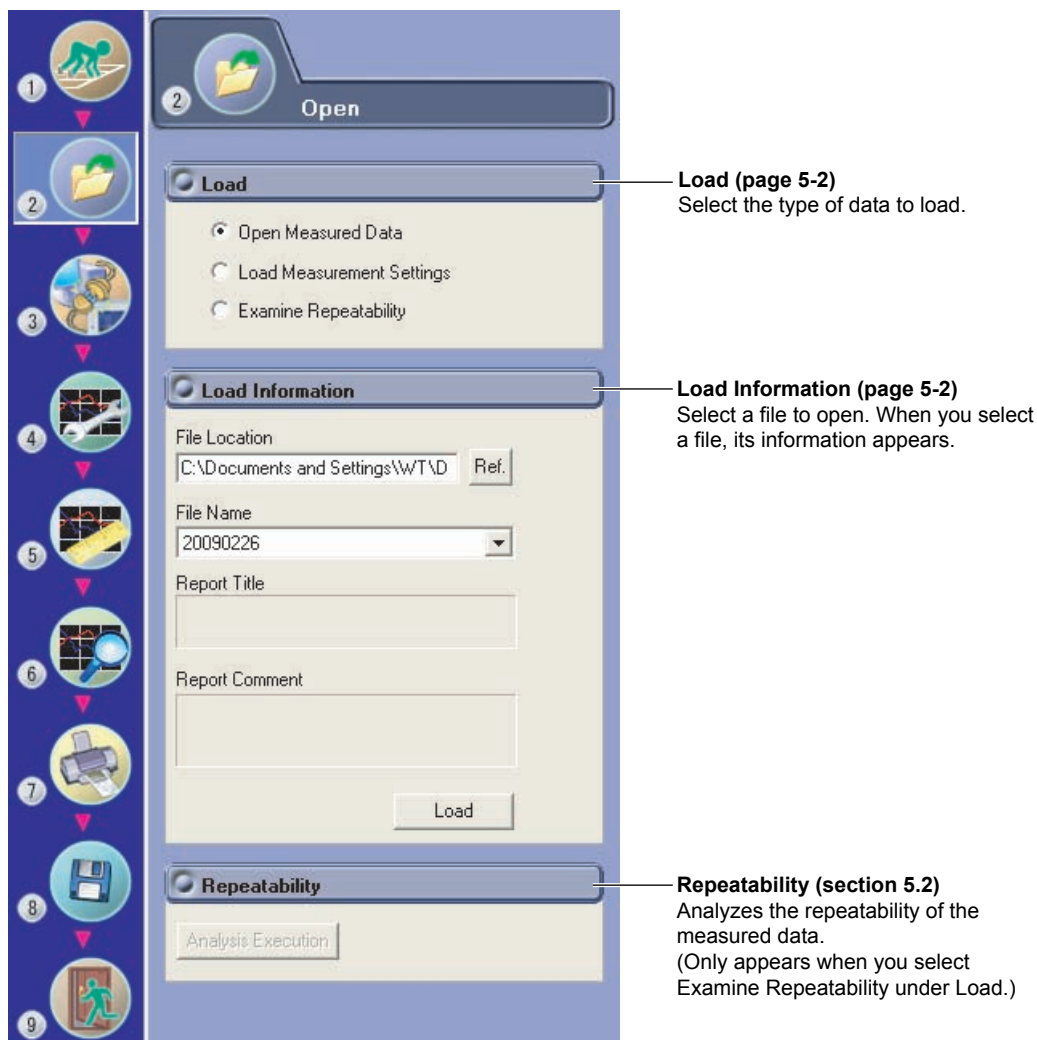
Click the icon below.



5.1 Loading Setting Information and Measured Data

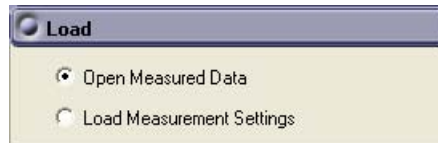
Procedure

1. Select the  icon in the menu area. The Open submenu appears.



Selecting the Type of Data to Load

2. Select one of the two data types listed under Load.



Selecting a File to Open

3. Specify the file location. There are two places where you can specify the file location.
 - Under Load Information in the submenu
 - At the top of the setting and display areaWhen you specify the file location, information about the files that can be loaded appears in the setting and display area.
4. Select a file to open. When there is more than one available file, you can select which file to open using one of the following two methods.
 - Click ▼ next to the File Name box under Load Information. A list of available files appears. Select a file from the list.
 - Select a file to open from one of the files listed in the setting and display area.
5. Click **Load**, or double-click the file you want to open. The software will open the measured data or setting information file.



Note

- When the software is in online mode, it will switch to offline mode if you click Load.
 - If an error occurs while loading the setting information, the settings are reset to their default values.
 - If an error occurs while loading measured data or setting information, the data may not be loaded properly. Confirm the filename and extension and then reopen the file.
 - You cannot load setting information, measured data, or waveform data while making measurements.
-

Configuring File Information Display Settings

- 1. Right-click the file information heading area at the top of the setting and display area. A list of the different types of information that can be displayed appears.
- 2. Select the type of information that you want to be displayed.

Date	Report Title	Report Comment	Measured Data	File Name
2007/12/28 08:48:45	✓ Date	Experimental mo...	-	IEC61000
2007/12/28 08:49:10	✓ Report Title	Experimental mo...	-	IEC61000_3_12_0
2006/11/29 19:37:42	✓ Report Comment	Experimental mo...	-	IEC61000_3_12_1
	✓ Measured Data			
	✓ File Name			

Explanation

Loading Setting Information

You can load the setting information that has been saved using the procedure described in section 11.1.

- A dash appears in the General Data and Manual Data columns for setting information files.
- Setting information file names have the following extension.
Extension: .ini
- Setting information files contain the following:
 - Measurement and judgment conditions (see chapter 7)
Data that has been acquired from the WT or loaded from a file can be judged using loaded judgment conditions.
 - Display settings (see chapters 8 and 9).
 - Report titles and comments (see section 10.1)
You can put comments and titles on reports of data acquired from the WT or loaded from files, and then print and save the reports. For more information about printing and saving, see chapters 10 and 11.

Loading Measured Data, Waveform Data, and Setting Information

- You can load the measured data, waveform data, and setting information that has been saved using the procedure described in section 11.1.
- You cannot load measured data, waveform data, or setting information while running the harmonic or waveform preview on the Measure page.
- An asterisk appears in the Measured data column for files that contain measured data.
- Files that contain measured data are composed of two types of files with the following extensions.
Extension: .fdt Measured data
 .ini Setting information

Note

This software cannot load CSV files.

5.1 Loading Setting Information and Measured Data

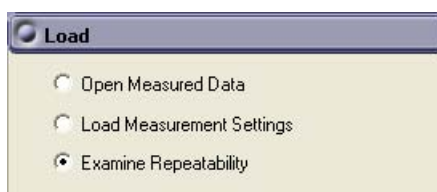
Kinds of File Information

- Date: When the file was saved. Displayed in this format: year/month/day hour:minute:second
- Report Title (See section 10.1)
- Report Comment (See section 10.1)
- Measured Data: When measured data is included in a file, an asterisk appears.
- Click ▼ or ▲ to switch between sorting in ascending and descending order.

5.2 Checking the Repeatability of the Measured Data

Procedure

1. Select the  icon in the menu area. The Open submenu appears. For general information about the Open submenu, see section 5.1.
2. Select **Examine Repeatability** listed under Load.



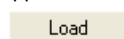
Selecting a File to Open

3. Specify the file location. There are two places where you can specify the file location.
 - Under Load Information in the submenu

- At the top of the setting and display area

When you specify the file location, information about the files that can be loaded appears in the setting and display area.

4. Select a file to open. You can select which file to open using one of the following two methods. Information about the selected file is displayed at the bottom of the setting and display area in the file analysis list.
 - Click ▼ next to the File Name box under Load Information. A list of available files appears. Select a file from the list and Click **Load**.



- Double-click a file in the measured data file list.
- Drag a file from the measured data file list to the file analysis list.
- Click  while a file is selected in the measured data file list.
- Right-click a file in the measured data file list, and then click **Add**.

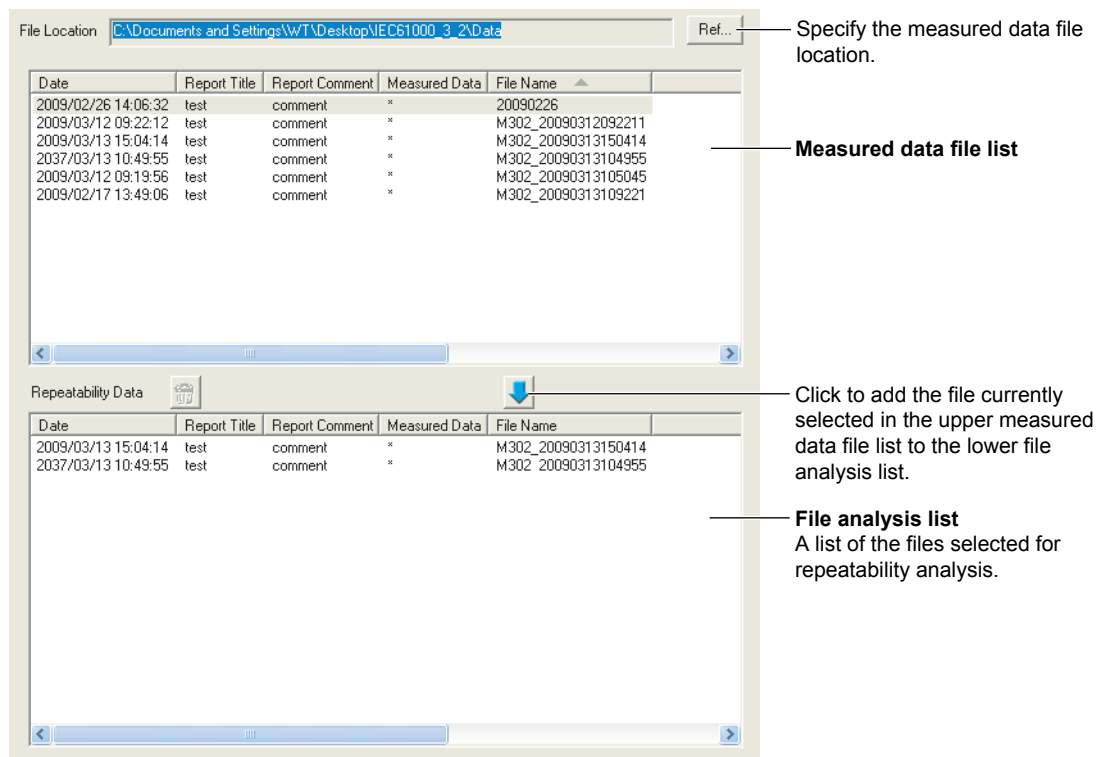


Note

This software can load data saved in files with .fdt and .ini extensions. This software cannot load CSV files (files with .csv extensions).

5.2 Checking the Repeatability of the Measured Data

5. Repeat step 4 to select all of the files that you want to compare.



Unselecting a File Selected for Analysis

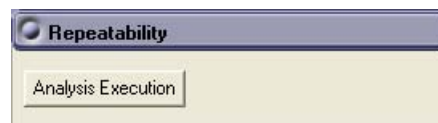
6. To unselect a file selected for analysis:

- Click  while a file is selected in the file analysis list.
- Drag a file in the file analysis list to .
- Press DELETE while a file is selected in the file analysis list.
- Right-click a file in the file analysis list, and then click **Delete**.

Delete

Starting Analysis

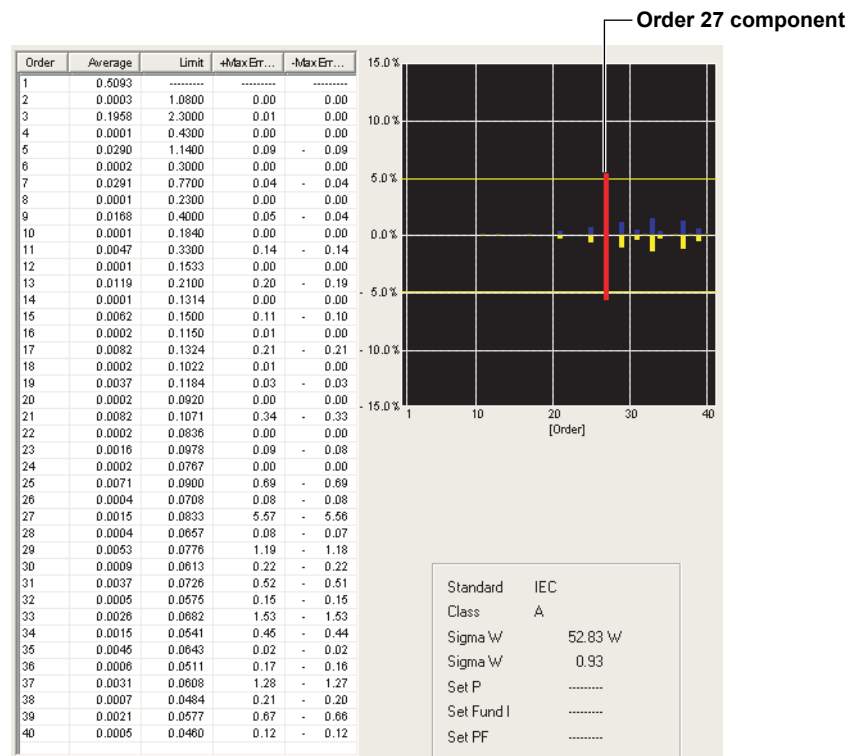
7. Click **Analysis Execution**. The analysis menu appears, and the results of the analysis of the measured data's repeatability appear.



Note

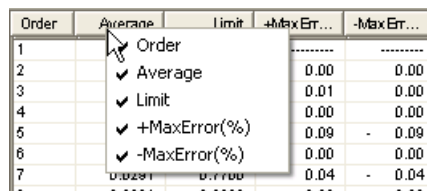
- For multi-phase equipment, it is recommended that files of the same input element (same phase) be selected and the data be compared. The repeatability cannot be evaluated correctly when using measured data of different phases.
- If only one file has been selected for analysis, the Analysis Execution button will be unavailable.
- If the software is in online mode, it will switch to offline mode when analysis starts.
- In the analysis menu, items other than repeatability will be dimmed and unavailable.
- When you start analysis, the Measure, Print, and Save menus will be dimmed and unavailable.

Example of Comparison: The difference at order 27 exceeds 5%.



Configuring File Information Display Settings

1. Right-click the file information heading area at the top of the setting and display area. A list of the different types of information that can be displayed appears.
2. Select the type of information that you want to be displayed.



Note

The order is always displayed. You cannot hide it.

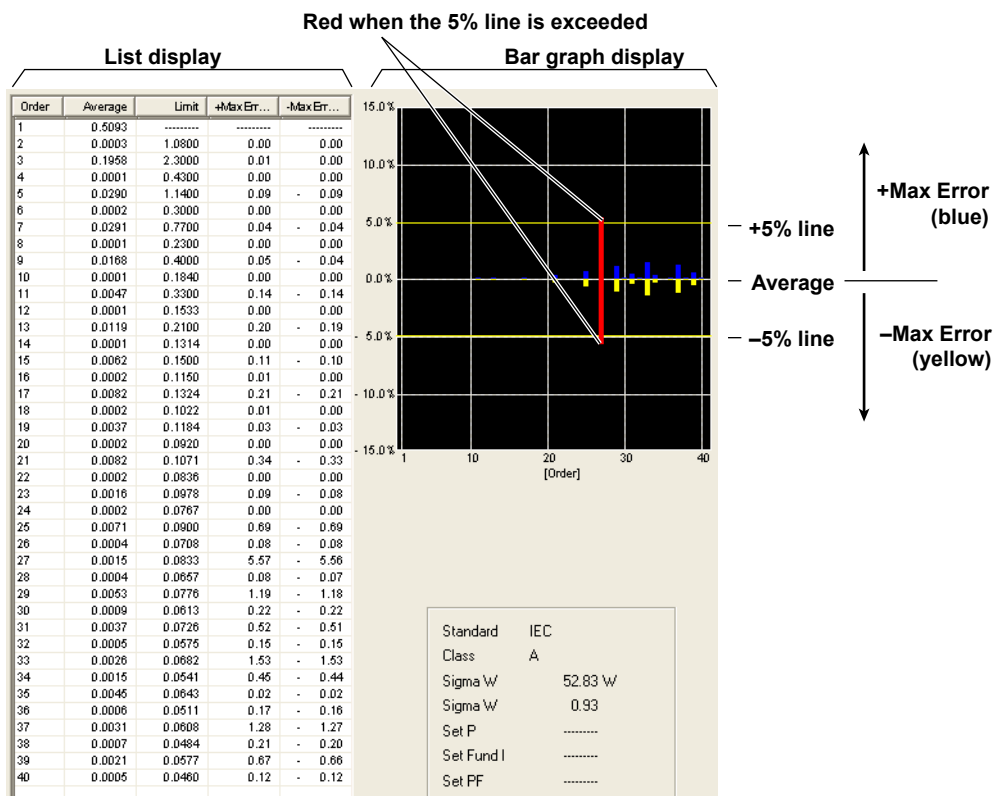
5.2 Checking the Repeatability of the Measured Data

Explanation

The mean value in the harmonics measurement data saved to files can be compared, and the difference in the measured data can be displayed on a bar graph and list for each order. This function can be used to evaluate whether the difference between data measured under the same measurement conditions when harmonics are measured using the same product or same product model is within 5% of the limits (confirmation of repeatability).

Repeatability of Measurement Data Window

The following figure shows an example of comparison.



Maximum (Mnmax)

Maximum value among the average values of each order

Minimum (Mnmin)

Minimum value among the average values of each order

Average (Mnmean)

Average of the average values of each order of the selected file

+Max Error

Ratio (%) of the difference between Mnmax and Mnmean of each order

$$\frac{\text{Mnmax} - \text{Mnmean}}{\text{Mnmean}} \times 100$$

-Max Error

Ratio (%) of the difference between Mnmin and Mnmean of each order

$$\frac{\text{Mnmin} - \text{Mnmean}}{\text{Mnmean}} \times 100$$

Color

• Bar Graph

The bar graph that is displayed for each order is displayed using a length converted from the +Max Error or –Max Error. The meaning of the colors is indicated in the following table.

	Blue Difference (error) less than the +5% line for +Max Error.
	Yellow Difference (error) less than the –5% line for –Max Error.
	Red Difference (error) greater than the +5% line for +Max Error. Difference (error) greater than the –5% line for –Max Error.

* The names of the sample colors of Microsoft Word or Excel are used for the names of the colors.

• List

The average, limit, +maximum error, and –maximum error for each order are displayed using values in black.

Number of Files That Can Be Compared

To evaluate the repeatability of the measured data, multiple files must be selected.
Number of files that can be compared: 2 to 10

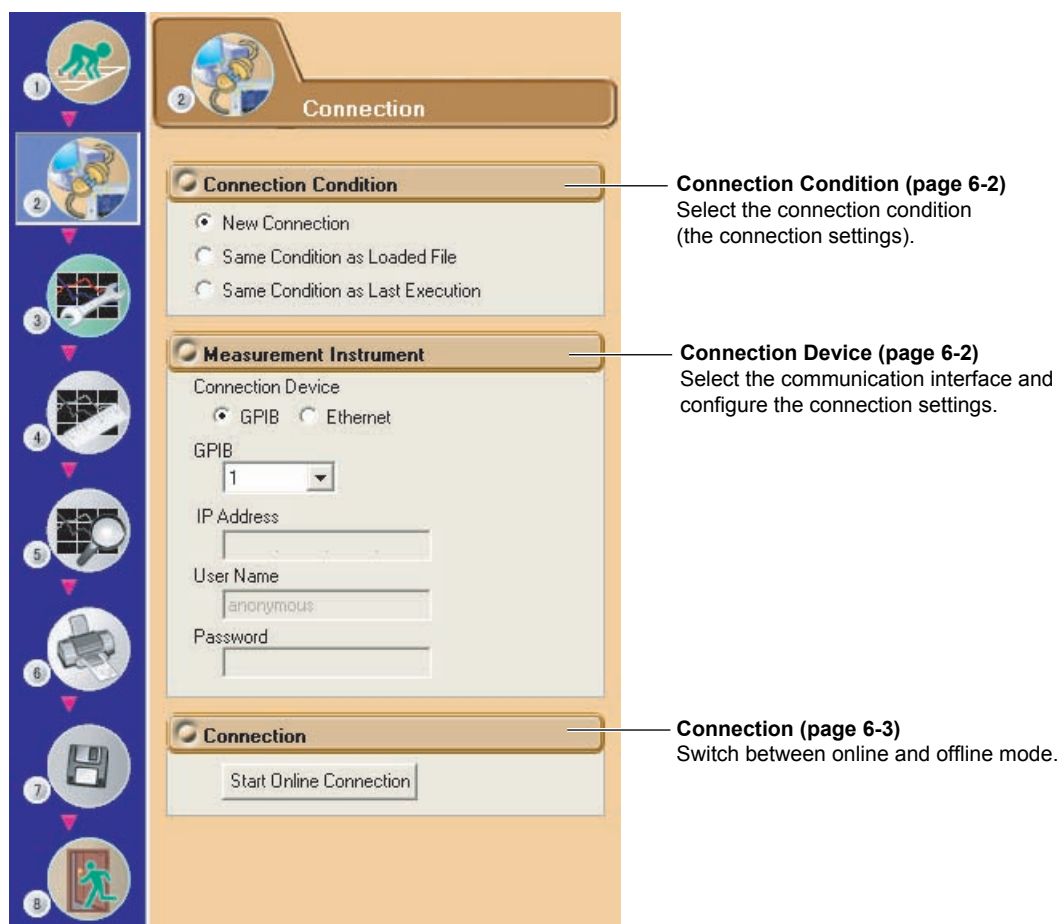
Note

- For multi-phase equipment, it is recommended that files of the same input element (same phase) be selected and the data be compared. The repeatability cannot be evaluated correctly when using measured data of different phases.
- Even if only one file is selected, the Repeatability of Measurement Data window will open. In this case, no comparison is made.
- To evaluate the repeatability, check that the measured data saved to the file to be compared was measured under the following conditions.
 - Same DUT (not the same model, but the same equipment).
 - Same test conditions.
 - Same test equipment.
 - Same atmospheric conditions (when the DUT is affected by them).

6.1 Establishing a New Connection Between the PC and a WT

Procedure

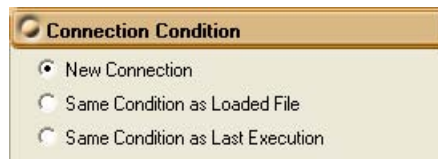
1. Select the  icon in the menu area. The Connection submenu appears.



6.1 Establishing a New Connection Between the PC and a WT

Connection Condition

2. Select New Connection.



The 'Connection Condition' dialog box has a title bar with a circular icon and the text 'Connection Condition'. Below the title bar, there are three radio button options: 'New Connection' (which is selected), 'Same Condition as Loaded File', and 'Same Condition as Last Execution'.

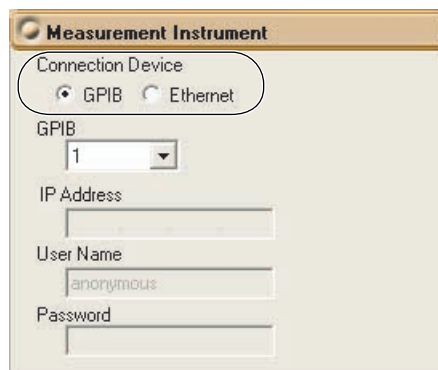
Note

- You can only select Same Condition as Loaded File if you load setting information or measured data using the procedure described in section 5.1.
 - You cannot select Same Condition as Last Execution when you first start up the software.
-

Connection Device

3. Select GPIB or Ethernet.

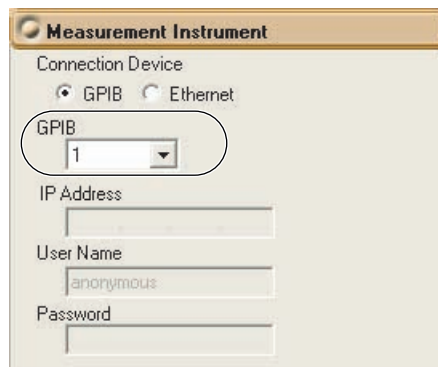
- If you select GP-IB, proceed to step 4.
- If you select Ethernet, proceed to step 5.



The 'Measurement Instrument' dialog box has a title bar with a circular icon and the text 'Measurement Instrument'. Below the title bar, there is a 'Connection Device' section with two radio buttons: 'GPIB' (selected) and 'Ethernet'. Below this, there is a 'GPIB' section with a dropdown menu showing '1'. Further down, there are three text input fields: 'IP Address', 'User Name' (containing 'anonymous'), and 'Password'.

Selecting a Communication Address (GP-IB)

4. Select the GP-IB address of the WT that you intend to connect to.



This is the same 'Measurement Instrument' dialog box as shown in the previous step. The 'GPIB' radio button is selected, and the 'GPIB' dropdown menu is circled, showing the value '1'.

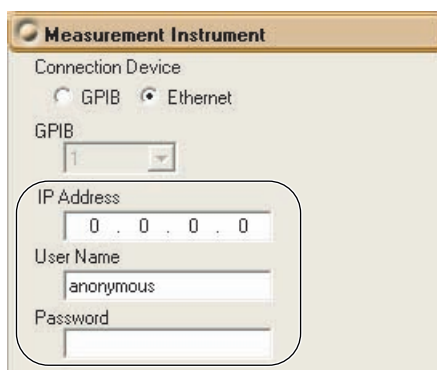
Proceed to step 6.

Note

- GP-IB address number 0 is reserved for the PC and cannot be selected.
-

Setting the IP Address, User Name, and Password (Ethernet)

5. Set the IP address, user name, and password of the WT that you intend to connect to.



The **Measurement Instrument** dialog box contains the following fields:

- Connection Device:** Radio buttons for **GPIB** and **Ethernet**. **Ethernet** is selected.
- GPIB:** A dropdown menu showing the value **1**.
- IP Address:** A text field with the value **0 . 0 . 0 . 0**.
- User Name:** A text field with the value **anonymous**.
- Password:** An empty text field.

Making the Connection

6. Click **Start Online Connection**. The software will establish a connection between the PC and the WT. The configuration and measurement operations listed onwards can be performed once the software has automatically determined that communication is possible.



The **Connection** dialog box contains a single button labeled **Start Online Connection**.

Note

- You cannot proceed to measurement, analysis, printing, or saving until an online connection has been established.
- If you click Start Online Connection and establish a connection, but the connected WT is not in a measurement-ready state, a communication error will occur. If the GP-IB address, IP address, user name, or password is wrong, or if the PC is simply unable to connect to the WT, a communication error will occur.

Explanation

Selecting a Communication Address

- **GP-IB**

Select the GP-IB address of the WT that you intend to connect to.

Selectable range: 1 to 30

- **Ethernet**

- Set the IP address of the WT that you intend to connect to.

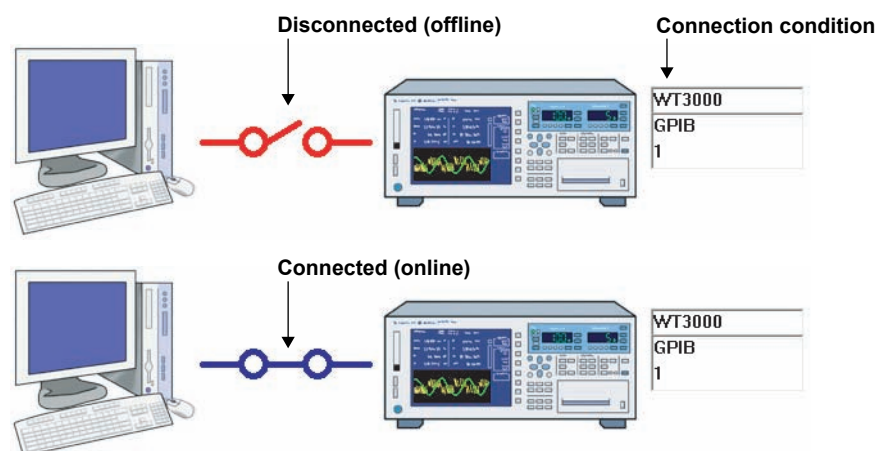
Selectable range: 0.0.0.0 to 255.255.255.255

- You can set the user name and password of the WT that you intend to connect to.

Usable characters: Those characters that the WT supports.

Displaying Connection Conditions and Status

The connection conditions that you set in the Connection submenu appear in the setting and display area along with the current connection status.



The connection status also appears in the information area.

Connection status



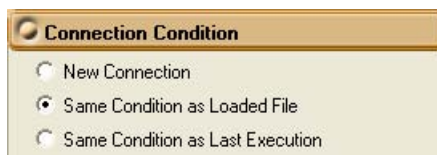
Note

- It can take more than 10 seconds to switch from offline to online mode.
- We recommend that you use a National Instruments GP-IB card. GP-IB cards made by other companies may not function properly.

6.2 Using the Connection Settings from a Loaded File

Procedure

1. Select the  icon in the menu area. The Connection submenu appears. For general information about the Connection submenu, see section 6.1.
2. Select **Same Condition as Loaded File** under Connection Condition.



Note

You can only select Same Condition as Loaded File if you load setting information using the process described in section 5.1.

Making the Connection

3. Click **Start Online Connection**. The software will establish a connection between the PC and the WT. The configuration and measurement operations listed onwards can be performed once the software has automatically determined that communication is possible.



Note

- You cannot proceed to measurement, analysis, printing, or saving until an online connection has been established.
- If you click Start Online Connection and establish a connection, but the connected WT is not in a measurement-ready state, a communication error will occur. If the GP-IB address, IP address, user name, or password is wrong, or if the PC is simply unable to connect to the WT, a communication error will occur.

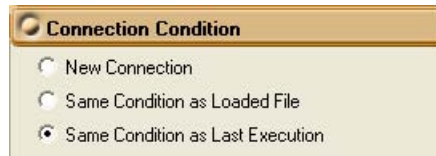
Explanation

Follow this procedure to use the settings from a file that has been loaded according to the procedure described in "Loading Setting Information" in section 5.1.

6.3 Using the Same Connection Settings as Before

Procedure

1. Select the  icon in the menu area. The Connection submenu appears. For general information about the Connection submenu, see section 6.1.
2. Select **Same Condition as Last Execution** under Connection Condition.



Note

You cannot select Same Condition as Last Execution when you first start up the software.

Making the Connection

3. Click **Start Online Connection**. The software will establish a connection between the PC and the WT. The configuration and measurement operations listed onwards can be performed once the software has automatically determined that communication is possible.



Note

- You cannot proceed to measurement, analysis, printing, or saving until an online connection has been established.
- If you click Start Online Connection and establish a connection, but the connected WT is not in a measurement-ready state, a communication error will occur. If the GP-IB address, IP address, user name, or password is wrong, or if the PC is simply unable to connect to the WT, a communication error will occur.

Explanation

Follow this procedure to set the connection settings to the same as when you last closed this software.

6.4 Ending a Connection by Switching to Offline Mode

Procedure

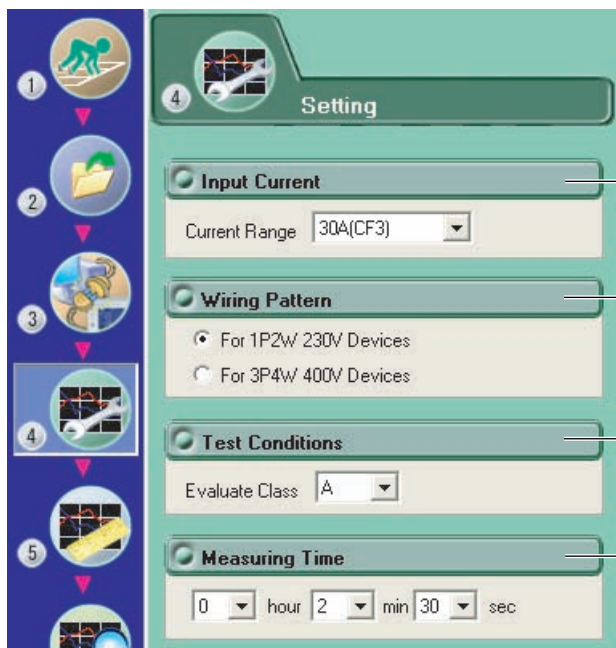
1. Select the  icon in the menu area. The Connection submenu appears. For general information about the Connection submenu, see section 6.1.
2. When you are in online mode, click **Exit online connection**. The software will disconnect from the WT.



7.1 Setting General Test Conditions

Procedure

1. Select the  icon in the menu area. The Setting submenu appears.



Input Current (page 7-2).
Select the current range to measure.

Wiring pattern (page 7-2)
Select the wiring pattern of the circuit whose current you will measure.

Test conditions (page 7-2)
Set the test conditions.

Measurement time (page 7-3)
Set the measurement time based on the conditions of the EUT.

In the setting and display area, you can switch between basic settings and advanced settings by clicking these buttons:  . For details, see sections 7.2 and 7.3.



Basic settings

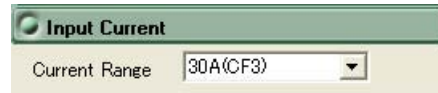


Advanced settings

7.1 Setting General Test Conditions

Input Current

2. Select the current range to measure.



Note

CF3 and CF6 indicate which value the crest factor is set to (3 or 6).

Wiring Pattern

3. Select the wiring pattern of the circuit you will measure.



Note

When you switch wiring patterns, the following settings, which are displayed in the setting and display area, will change to default values that are appropriate to the wiring pattern that you select. For details, see sections 7.2 and 7.3.

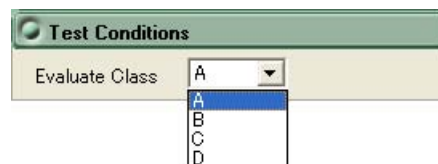
- The WT settings (the settings on the WT Measurement Instrument tab)
 - The testing judgment conditions (the settings under the Standard tab).
-

Test Conditions

4. You can set the class of the EUT to A, B, C, or D.

The display shown below appears when you set the wiring pattern to one of the following:

- For 1P2W 230V Devices
- For 3P4W 400V Devices



5. If you select class C, specify whether or not the power range exceeds 25 W.

Test Conditions

Evaluate Class: C

PowerRange: > 25W

apply limit value: > 25W, <= 25W

6. If you select class C and the power range is 25 W or lower, select one of the following:
- apply limit value of Class D
 - judge with current wave pattern of 3rd&5th

Test Conditions

Evaluate Class: C

PowerRange: <= 25W

apply limit value: apply limit value of Class D, judge with current wave pattern of 3rd&5th

Measurement Time

7. Set the measurement time.

Measurement time

0 hour 2 min 30 sec

Note

When you change test conditions or the measurement time, the judgment conditions on the standard tab that are displayed in the setting and display area will change accordingly. For details, see section 7.3.

Explanation

Wiring Pattern

When you are measuring using the limits specified by IEC 61000-3-2, select one of the following wiring patterns:

- For 1P2W 230V Devices
- For 3P4W 400V Devices

Test Conditions

- **Class (Evaluate Class)**

Select the class from A, B, C, and D, according to the classifications specified in the standard. The setup information varies depending on the class selected here.

- **Class A**

- See section 7.3 for selecting the lower power limit for applying the limits
- Selecting Whether to Apply the Limit for Air Conditioners Exceeding 600 W for JIS Class A

In JIS Class A, special limits are defined for air conditioners that exceed 600 W. You can select whether to apply this limit.

- **Class B**

The setup information is the same as class A. The limits applied are 1.5 times the limits for class A.

- **Class C**

Specify whether or not the EUT's active power exceeds 25 W.

- When the Active Power of the EUT Exceeds 25 W (>25 W)

For details on setting the fundamental current and the power factor, see section 7.3.

- When the Active Power of the EUT Is Less Than or Equal to 25 W (≤ 25 W)

The IEC standard specifies that either "the power ratio limits of class D" or "the conditions of harmonic order 3 and 5" are met.

- Evaluating by Applying the Power Ratio Limits of Class D

The same power ratio limit of class D is applied.

For details on setting the power, see section 7.3.

- Evaluating on the Conditions of Harmonic Order 3 and 5

The IEC standard specifies the current ratio of harmonic order 3 and 5 to the fundamental frequency and the relationship between the fundamental current and the current waveform (see page 1-11).

For details on setting the fundamental current, see section 7.3.

- **Class D**

For information about the following settings, see section 7.3.

- Selecting the Power
- Selecting the Lower Power Limit for Applying the Limits

Measurement Time

The measurement time is the time between the start of the measurement to the end of the measurement. The time for measuring harmonics can be set in advance. The harmonics can be measured continuously for the specified time. The measurement time can be changed when equipment that emits harmonics that fluctuate over time is measured or when confirming that the emitted harmonics do not change even when the equipment is operated over extended time.

Selectable range: 0 H 0 M 1 S to 24 H 0 M 0 S in units of 1 s.

- An error occurs if a time exceeding 24 hours is specified.
- If the measurement time is set to 0 H 0 M 0 S and the measurement is started, measurement continues until you choose Stop Test from the Measure menu or click the stop test icon on the toolbar.

Note

Depending on the environment of the PC onto which this software was installed, an error occurs if you specify a time longer than the memory area that can be reserved. In this case, you may be able to increase the available time by exiting other applications or by increasing the amount of memory available to the PC.

7.2 Setting the WT Measurement Conditions

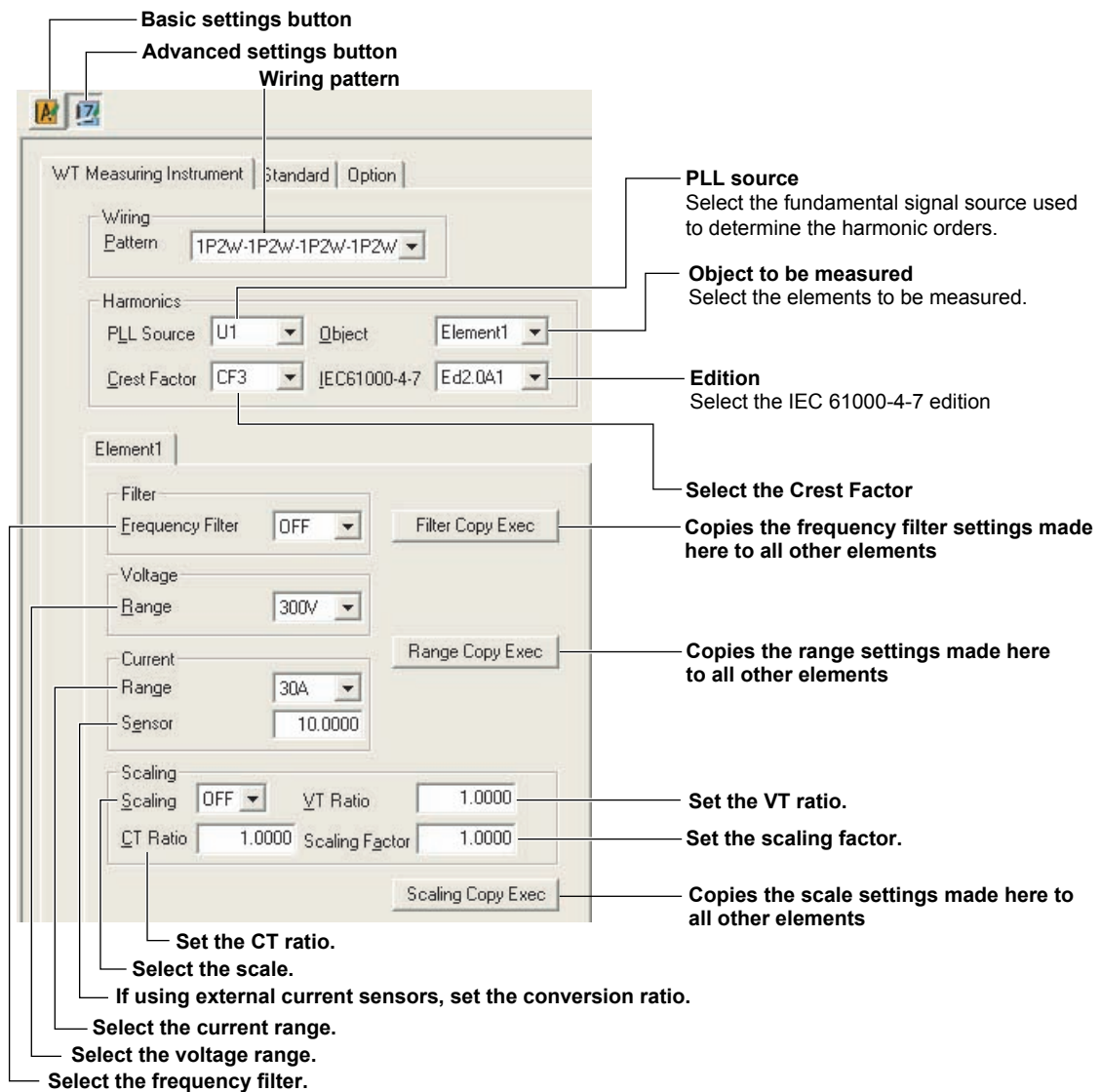
Procedure

1. Select the **WT Measurement Instrument** tab in the setting and display area. The WT measurement condition configuration dialog box appears.
2. Click the basic settings button  or the advanced settings button .
3. Configure the various settings.

Note

When you select the basic settings button, the following settings are unavailable. To adjust these settings, click the advanced settings button.

- Frequency Filter and Filter Copy Exec
- Scaling Copy Exec
- All of the settings under Scaling



Explanation**Selecting an Edition of the Standard**

In WT firmware versions 4.11 and later, you can select the IEC 61000-4-7 edition from one of the following choices:

- Ed 1.0
- Ed 2.0
- Ed 2.0 A1

IEC 61000-4-7 specifies requirements for measurement instruments. For details, see chapter 14. In WT firmware versions 4.01 to 4.10, the edition is fixed at 2.0.

Copying the Frequency Filter

You can copy the frequency filter settings configured for one element to all other elements with the same wiring.

Copying the Range

You can copy the range settings configured for one element to all other elements with the same wiring. The voltage range and the current range are copied.

Copying the Scaling Settings

You can copy the scaling settings configured for one element to all other elements with the same wiring. The settings that are copied are:

- External current sensor conversion ratio
- VT ratio
- CT ratio
- Scaling factor

For information about the following settings and how to make settings from the WT, see the WT3000 User's Manual (IM760301-01E).

Setting	Corresponding user's manual and section	
Wiring Pattern	IM760301-01	Section 4.1
PLL source	IM760301-51	Section 7.5
Crest factor	IM760301-01E	Section 4.6
Frequency filter	IM760301-01E	Section 4.8
Voltage/current range	IM760301-01E	Sections 4.3 and 4.4
Scaling	IM760301-01E	Section 4.5

Note

- When the wiring system is pattern 1 (when all are 1P2W), filter, range, and scaling are copied to all other elements.
- When taking measurements with this software, the antialiasing filter cutoff frequency is fixed at 5.5 kHz.
- To make accurate measurements, turn ON the frequency filter of the input element set to PLL source.
- The exponential average function of the WT is ON.

7.2 Setting the WT Measurement Conditions

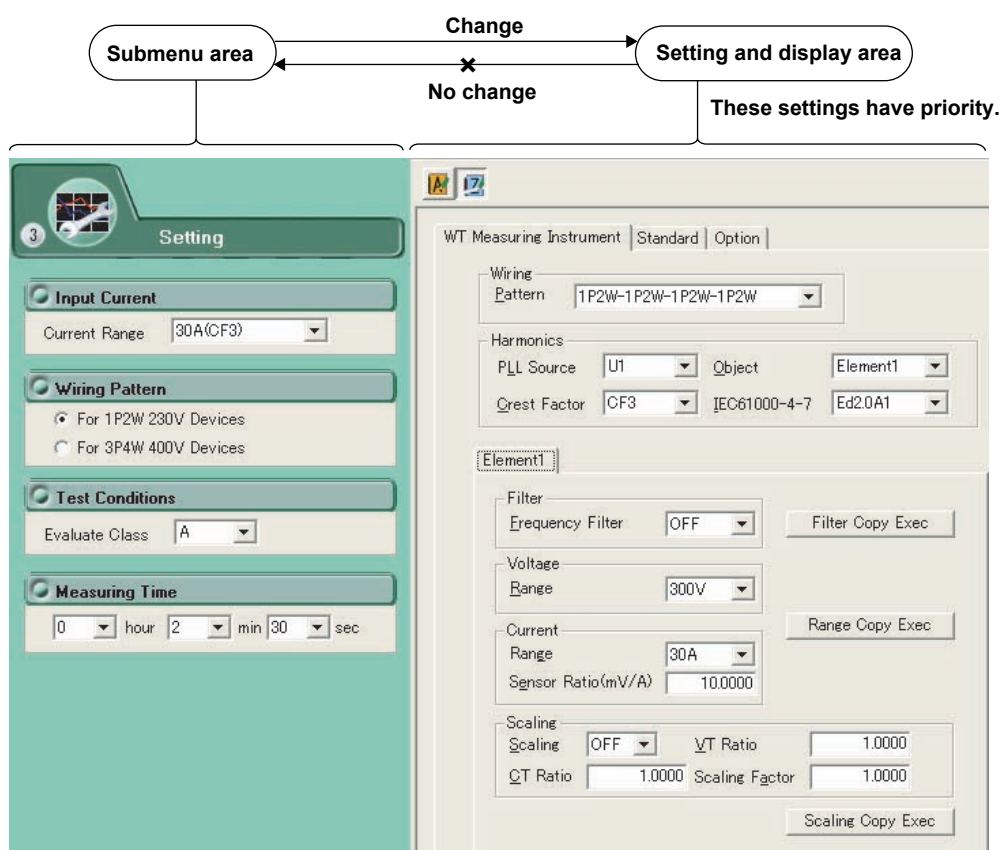
Shared Settings between the Submenu and the Setting and Display Area

When you change the following settings in the submenu, the settings in the setting and display area will also change.

- Current Range (see page 7-9)
- Wiring Pattern (see page 7-10)
- Test Conditions (see section 7.3)
- Measurement time (see section 7.3)

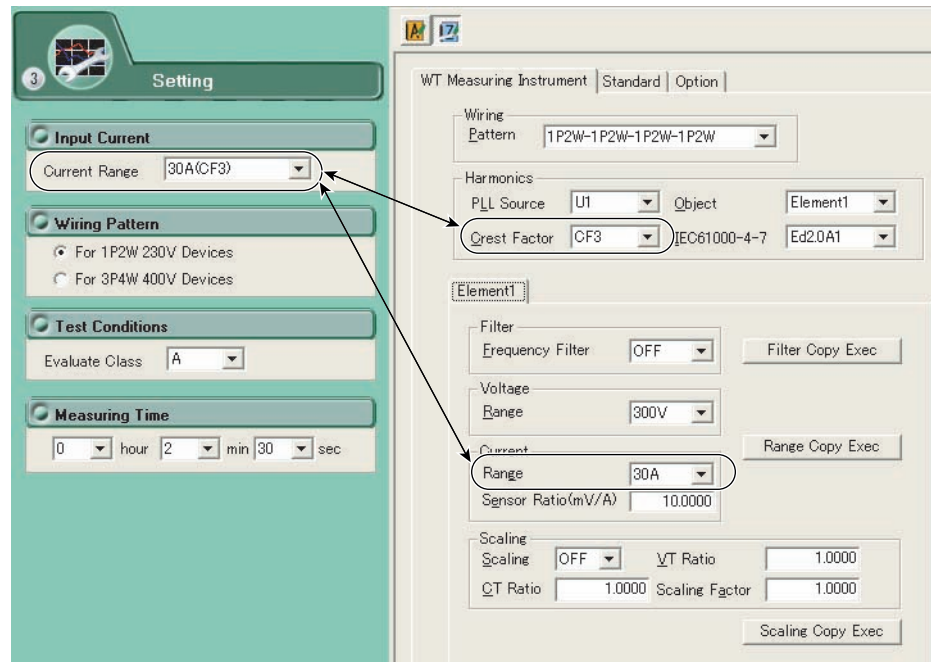
The settings in the submenu will not change when you change the settings in the setting and display area.

When the settings in the submenu and the setting and display area are different, the settings in the setting and display area take precedence.



Setting Changes Based on Current Range Selection

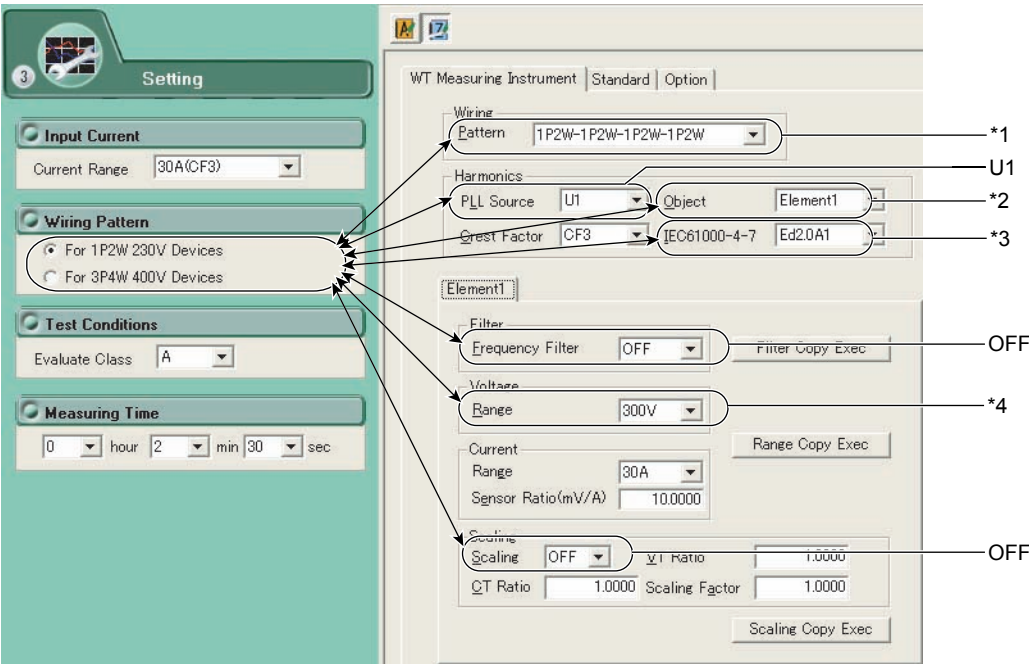
When you select a current range in the Setting submenu, the settings marked off in the following figures will also change.



7.2 Setting the WT Measurement Conditions

Setting Changes Based on Wiring Pattern Selection

When you select a wiring pattern in the Setting submenu, the settings marked off in the following figures change to their default values. The values in the figures are the default values.



*1 The default setting for Wiring Pattern varies depending on the wiring pattern and the number of elements installed in the WT.

Wiring Pattern	1Element	2Element	3Element	4Element
For 1P2W 230V Devices	1P2W	1P2W-1P2W	1P2W-1P2W-1P2W	1P2W-1P2W-1P2W-1P2W
For 3P4W 400V Devices	1P2W ^{*5}	1P2W-1P2W ^{*5}	3P4W	3P4W-1P2W

*5 An error message appears, because there are not enough elements.

*2, *4The default setting for Object and Voltage Range varies depending on the wiring pattern.

Wiring Pattern	Object	Voltage Range
For 1P2W 230V Devices	Element 1	300V
For 3P4W 400V Devices	SigmaA ^{*6}	300V

*6 If the error described above in *5 occurs because of the selected wiring pattern, Object is automatically set to Element 1.

- *3 The IEC 61000-4-7 default setting is different depending on the WT firmware version.
- For versions 4.11 and later, the setting is Ed2.0A1.
 - For versions before 4.11, the setting is Ed2.0.

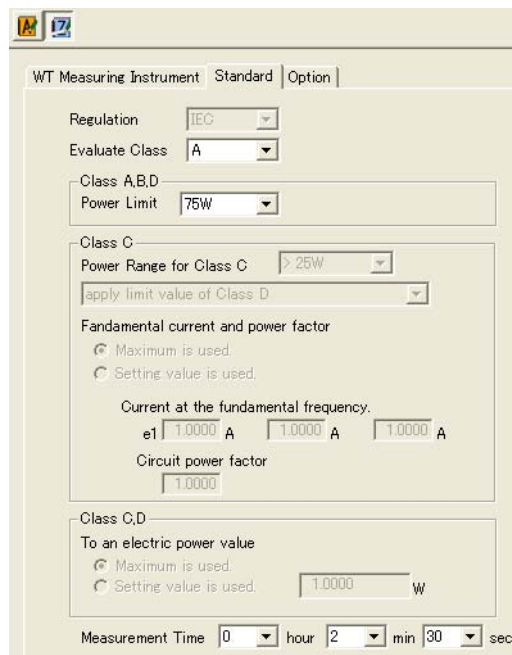
7.3 Setting the WT Judgment Conditions

Procedure

1. Select the **Standard** tab in the setting and display area. The judgment condition configuration dialog box appears.
2. Configure the various settings.

Note

The items that you can set are the same whether you press the basic settings button  or the advanced settings button .



WT Measuring Instrument | Standard | Option

Regulation: IEC

Evaluate Class: A

Class A,B,D
Power Limit: 75W

Class C
Power Range for Class C: > 25W
apply limit value of Class D: ☐

Fundamental current and power factor
☒ Maximum is used.
☐ Setting value is used.
Current at the fundamental frequency.
e1: 1.0000 A 1.0000 A 1.0000 A
Circuit power factor: 1.0000

Class C,D
To an electric power value
☒ Maximum is used.
☐ Setting value is used. 1.0000 W

Measurement Time: 0 hour 2 min 30 sec

Explanation

For explanations of these terms, see section 1.3 and 1.5.

Standard (Regulation)

The software can make measurements and evaluations according to the IEC or JIS standard (see section 1.3).

Class (Evaluate Class)

Select the class from A, B, C, and D, according to the classifications specified in the standard. The setup information varies depending on the class selected here.

Class A, B, and D

Selecting the Lower Power Limit for Applying the Limits

Select 50W, 75W, None, or Infinity. When the active power of the EUT is less than the selected power, the limits are not applied.

Class C

- **Power Range**

Specify whether or not the EUT's active power exceeds 25 W.

- When the Active Power of the EUT Exceeds 25 W (>25 W)

Set the fundamental current and the power factor.

- When the Active Power of the EUT Is Less Than or Equal to 25 W (≤ 25 W)

The IEC standard specifies that either “the power ratio limits of class D” or “the conditions of harmonic order 3 and 5” are met.

- Evaluating by Applying the Power Ratio Limits of Class D

The same power ratio limit of class D is applied.

Set the power.

- Evaluating on the Conditions of Harmonic Order 3 and 5

The IEC standard specifies the current ratio of harmonic order 3 and 5 to the fundamental frequency and the relationship between the fundamental current and the current waveform (see page 1-11).

Set the fundamental current.

- **Fundamental current and power factor**

Determine whether to set the EUT fundamental current and power factor values that are necessary for determining the limits by specifying them manually or by measuring them.

You can also set the fundamental current and the power factor to the values that you measure according to the procedure in section 8.6. If you are going to measure the values, first set the load of the EUT as high as possible.

Class D

- **To an electric power**

Determine whether to set the power value that is necessary for determining the limits by specifying it manually or by measuring it.

You can also specify the value that you measure according to the procedure in section 8.6. If you are going to measure the value, first set the load of the EUT as high as possible.

Measurement Time

The measurement time is the time between the start of the measurement to the end of the measurement. The time for measuring harmonics can be set in advance. The harmonics can be measured continuously for the specified time. The measurement time can be changed when equipment that emits harmonics that fluctuate over time is measured or when confirming that the emitted harmonics do not change even when the equipment is operated over extended time.

Selectable range: 0 H 0 M 1 S to 24 H 0 M 0 S in units of 1 s.

- An error occurs if a time exceeding 24 hours is specified.
- If you set the measurement time to 0 H 0 M 0 S and begin measurement, measurement will continue until you click Stop Test in the Measure submenu or press the stop test icon in the tool bar.

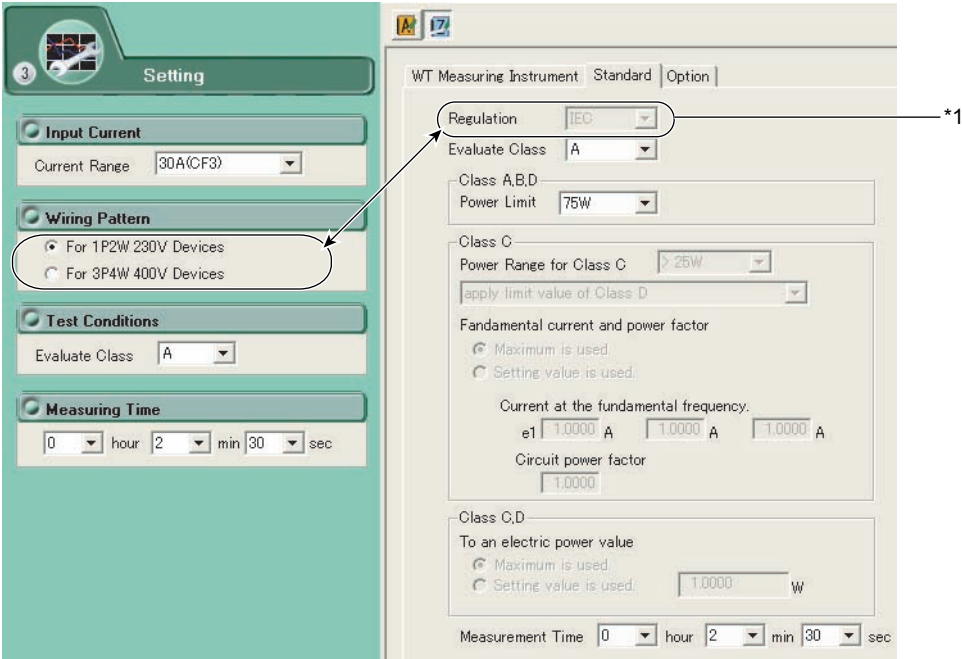
Note

Depending on the environment of the PC onto which this software was installed, an error occurs if you specify a time longer than the memory area that can be reserved. In this case, you may be able to increase the available time by exiting other applications or by increasing the amount of memory available to the PC.

7.3 Setting the WT Judgment Conditions

Setting Changes Based on Wiring Pattern Selection

When you select a wiring pattern in the Setting submenu, the settings marked off in the following figures change to their default values. The values in the figures are the default values.

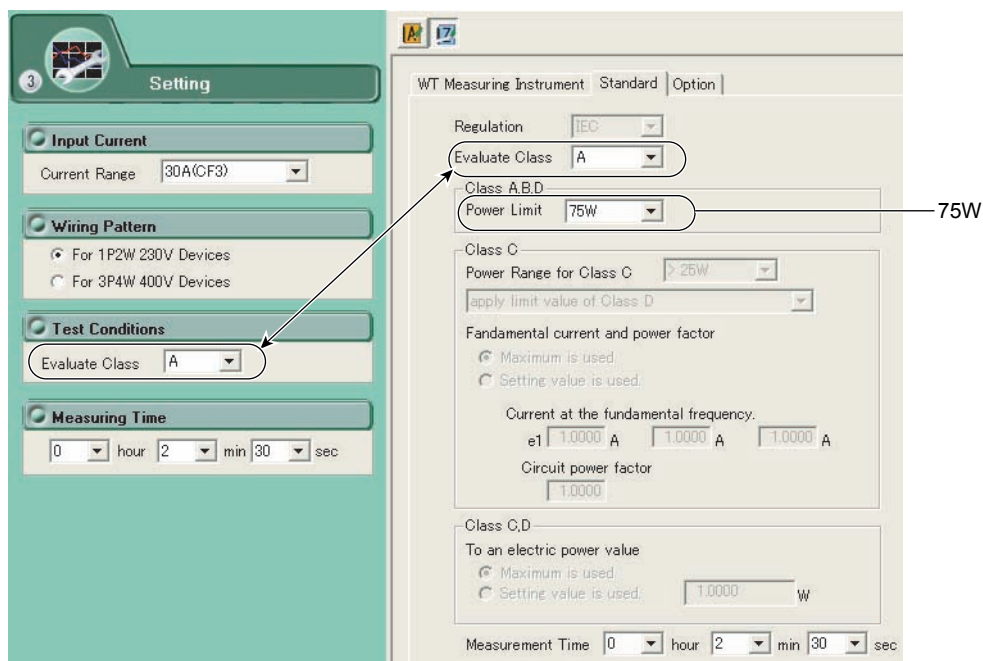


Wiring Pattern	*1
For 1P2W 230V Devices	IEC
For 3P4W 400V Devices	IEC

Setting Changes Based on Class Selection

Changes when you select “Class A” or “Class B.”

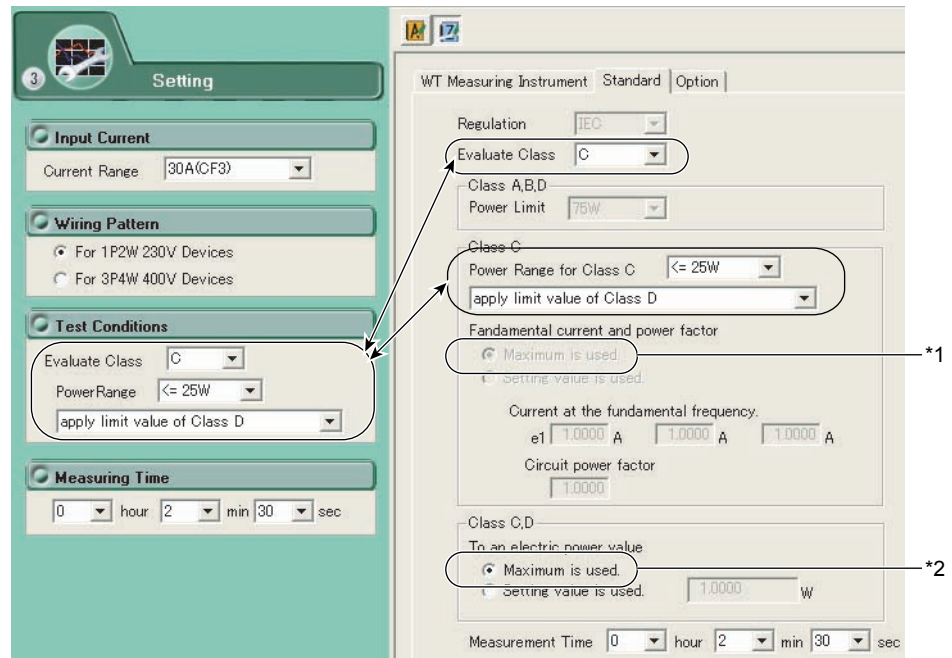
When you select class A or class B in the Setting submenu, the settings marked off in the following figures will also change. And the lower power limit for applying the limits will change to its default value. The value in the figures are the default values.



7.3 Setting the WT Judgment Conditions

Changes when you select “Class C.”

When you select class C in the Setting submenu, the settings marked off in the following figures will also change. And the fundamental current and the power factor will change to their default values. The values in the figures are the default values.



*1 The setting for the fundamental current and the power factor values is set to “Maximum is used” by default when:

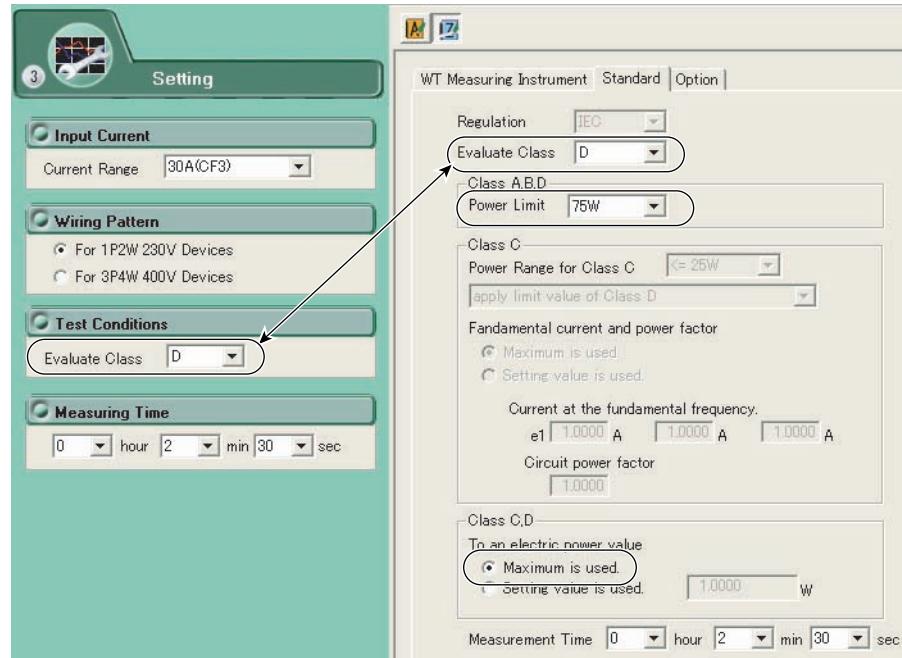
- You set the power class to “> 25W.”
- You set the power class to “<= 25W” and you set the limits to “judge with current wave pattern of 3rd&5th.”

*2 The setting for the power value is set to “Maximum is used” by default when:

- You set the power class to “<= 25W” and you set the limits to “apply limit value of Class D.”

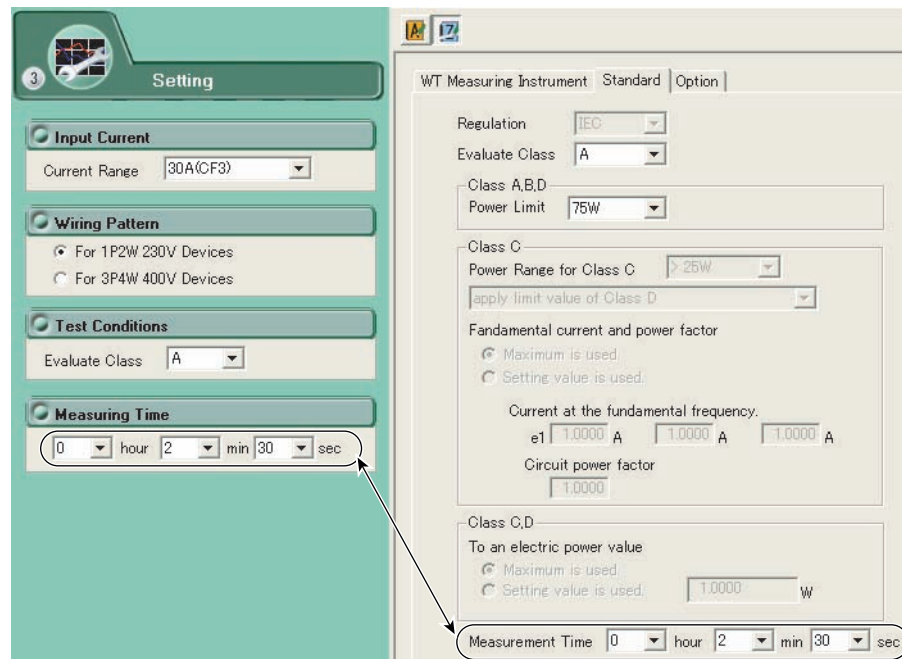
Changes when you select “Class D.”

When you select class D in the Setting submenu, the settings marked off in the following figures will also change. And the lower power limit for applying the limits and the power factor will change to their default values. The values in the figures are the default values.



Setting Changes Based on Measurement Time Selection

When you select measurement time in the Setting submenu, the settings marked off in the following figures will also change.



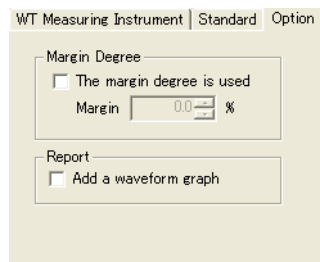
7.4 Setting the Optional Conditions

Procedure

1. Select the **Option** tab in the setting and display area. The optional condition configuration dialog box appears.
2. Configure the various settings.

Note

The items that you can set are the same whether you press the basic settings button  or the advanced settings button .



Explanation

For explanations of these terms, see section 1.5.

Margin Degree

Select whether or not to set a margin degree for judgment. If you choose to set a margin degree, specify it as a percentage. If you set the margin degree to 5.00%, the limits will be narrowed by 5%. If you set the margin degree to 0.00%, the limits will be used as is.

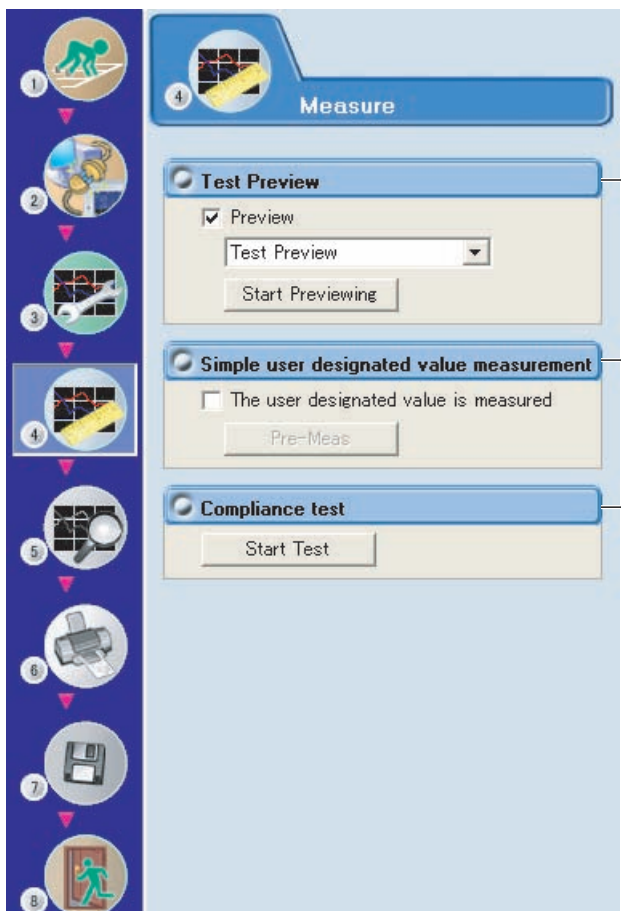
Report

Select this check box to include a waveform graph in the report.

8.1 Previewing Harmonic Data and Waveform Data

Procedure

1. Select the  icon in the menu area. The Measure submenu appears.



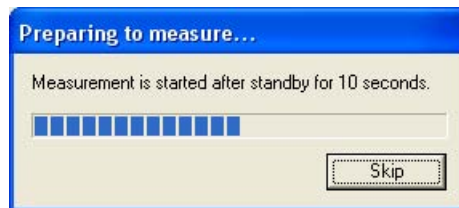
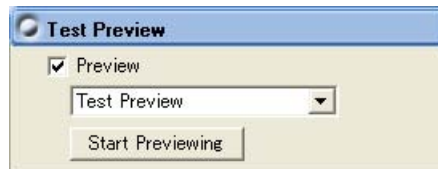
Test preview (page 8-2)
Before you start a test, you can check harmonic measurement data and waveform data. You can execute a compliance test without previewing data.

Simple user designated value measurement (section 8.6)
Appears if you set the class to C or D in the test conditions described in chapter 7. The fundamental current, circuit power factor, and power values are measured.

Compliance test (section 8.7)
Executes a compliance test based on harmonic measurement.

Previewing Test Data

2. Select the **Preview** check box.
3. Select the preview that you want to display.
4. Click **Start Previewing**. A message will appear to indicate that you have to wait before measurement starts. After that, the measured harmonic values will appear in the display area.

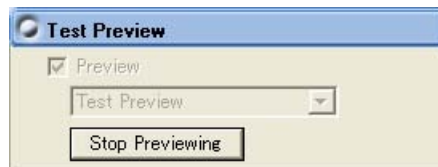


Note

When you preview the harmonics of a current, the data that had been acquired or loaded before the preview is discarded. Be sure to save any compliance test data before you begin a test preview (for information on how to save data, see chapter 11).

Stopping a Test Preview

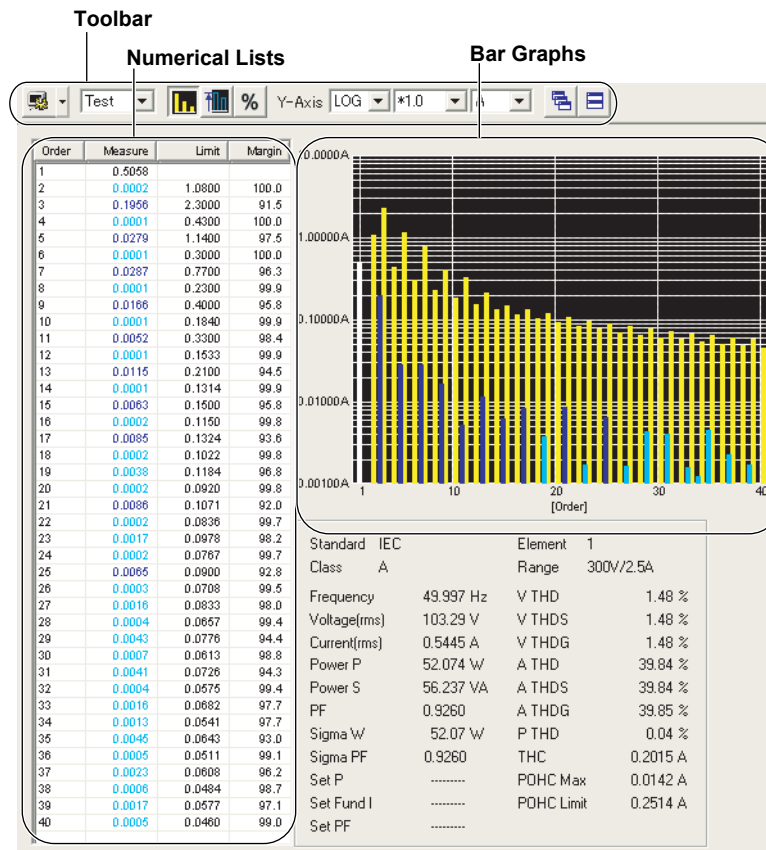
Click **Stop Previewing**.



8.2 Setting the Display of the Test Preview

Procedure

An Example of the Test Preview



Measured value lists
For explanations of these terms, see section 1.5.

An Example of the Setting and Display Area

Sampled data count

When a preview is being displayed, the display here is 0/0. When a compliance test is being executed, the number of times measured data has been acquired is displayed (for details, see section 8.2).

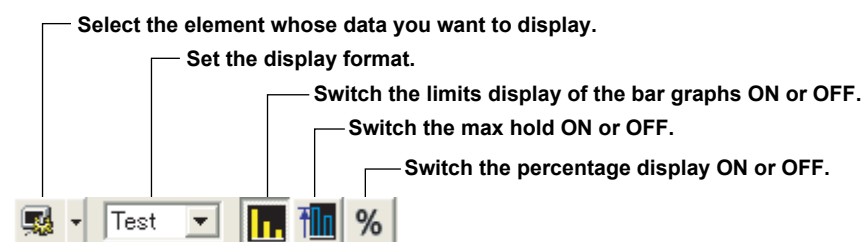
Measure time

When a preview is being displayed, the display here is 0.0sec/[the measurement time set according to the procedure described in chapter 7]. When a compliance test is being executed, the amount of time for which measured data has been acquired is displayed (for details, see section 8.2).

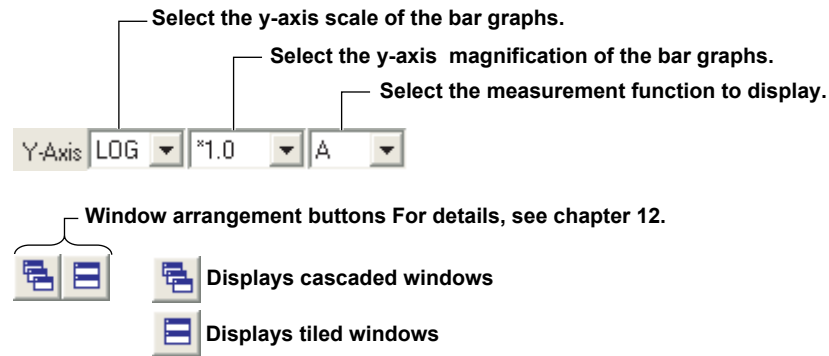
Sample Count : 0/0

Measure Time : 0.0sec/150sec

Toolbar



8.2 Setting the Display of the Test Preview

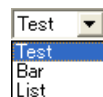


Selecting the Element Whose Data You Want to Display

Click . If input elements 1 to 3 are being measured, as you click the icon, the displayed data will switch from element 1, to element 2, to element 3, to element 1, and so on. Click ▼ to select an element directly.

Selecting the display format

Select **Test(Bar+List)**, **Bar**, or **List**.

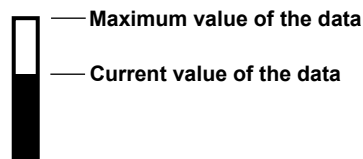


Switching the Limits Display of the Bar Graphs ON or OFF.

Click  to select whether or not to display the limits in the bar graph. The limits are displayed using yellow bars. Limits are only applied to harmonic current values. There are no specified limits for voltages or phase angles. So limits for these values are not displayed.

Switching the Max Hold ON or OFF.

Click  to turn MaxHold ON. The maximum value of the measured data is held when MaxHold is ON. When MaxHold is ON, bars are displayed as shown below.



Switching the Percentage Display ON or OFF.

Click  to turn the percentage display ON and display the following items as percentages.

- **Numerical lists**
 - The relative harmonic data or content of each order
 - Limits
- **Bar graphs**
 - The Y-axis scale

- **Measured value lists**

- THC
- POHC
- POHC maximum
- POHC limit

- The percentage display is applied only to harmonic current.
- Percentage display is valid when the class is set to C in the test conditions and one of the following conditions is met:
 - You set the power class to "> 25W."
 - You set the power class to "<= 25W" and you set the limits to "judge with current wave pattern of 3rd&5th."
- On the Percentage Display, The relative harmonic content of current of each order can be displayed on bar graphs with the specified fundamental current (fundamental current specified in advance when making Class C evaluation, see section 3.5) taken to be 100%.
- When limits are specified by the relative harmonic content of order 3 and 5 such as the limits for Class C equipment with active input power less than or equal to 25 W, bars corresponding to the magnitude of the values are displayed.
- When the magnification of the Y-axis scale is *1.0, the maximum scale of Y-axis is 100.00%.

Selecting the Y-Axis (Current Magnitude) Scale

- **Selecting the Type of Y-Axis Scale**

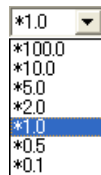
Select LIN (linear) or LOG (logarithmic).



- **Selecting the Magnification**

When the type of scale is LIN, select *100.0, *10.0, *5.0, *2.0, *1.0, *0.5, or *0.1.

When the type of scale is LOG, select *100.0, *10.0, *1.0, or *0.1.



Selecting the Measurement Function to Display

Select A, V, or Deg (for current, voltage, or phase angle).



Explanation

Colors of the numerical lists and bar graphs of the current

The table below describes what the colors. Condition 1, Condition 2, 200% short-term relaxation, and POHC relaxation conditions that appear in the table are defined below.

- **Condition 1**
The maximum harmonic current over the measurement time is within 1.5 times the specified limit. Evaluation is made on each order.
- **Condition 2**
The mean harmonic current over the measurement time is within the specified limit. Evaluation is made on each order.
- **200% Short-Term Relaxation Conditions**
If all of the following conditions are met, up to 200% of the specified limits is permitted.
 - The EUT belongs to Class A for harmonics.
 - The excursion beyond 150 % of the applicable limits lasts less than 10 % of the test observation period or in total 10 min (within the test observation period), whichever is smaller.
 - The average value of the harmonic current, taken over the entire test observation period, is less than 90 % of the applicable limits.
- **POHC Relaxation Condition**
If the maximum value of the sum of partial odd harmonic currents (POHC) of order above and including 21 is less than the specified POHC limit, the mean of the odd harmonic currents of order above and including 21 is permitted to be 1.5 times the specified limit.

	Blue Limit not exceeded.
	Red Limit exceeded.
	Yellow (applies only to bar graph) Limit specified by the applicable standard.
	Black (applies only to numerical list) No applicable limit is specified. (The measured value of the fundamental frequency and orders that are not applicable is displayed in black.)
	White (applies only to numerical list) No applicable limit is specified. (The bar graph of the fundamental frequency and orders that are not applicable is displayed in white.)
	Turquoise The measured data is less than the larger of the two values, 0.6% of the mean rms current and 5 mA.
	Aqua • Limit exceeded. • Excluded from applying the limits because the maximum active power is less than the minimum power (75 W or 50 W) for applying the limits or set to Infinity.

* The names of the sample colors of Microsoft Word or Excel are used for the names of the colors.

Colors of the numerical lists and bar graphs of the voltage and phase angle

There are no voltage or phase angle limits. Bar graphs of harmonic voltage or phase angle are displayed in white. The values displayed in the list are black.

Numerical Lists

- **Limit**

- The limits specified in the applicable standard are displayed in a list for each order.
- The harmonic data shown in the Test preview consists of instantaneous values, so the listed limit values and yellow bars are shown using values that are 1.5 times larger than the limits.
- The limits are applied only to harmonic current.
- If the Percentage Display check box is selected, the relative harmonic content of the limit of each order can be displayed with the specified fundamental current (fundamental current specified in advance when making Class C evaluation, see section 7.3) taken to be 100%.
- When limits are specified by the relative harmonic content of order 3 and 5 such as the limits for Class C equipment with active input power less than or equal to 25 W, the current value converted from the relative harmonic content of order 3 and 5 with the fundamental current specified in advance (see section 7.3) taken to be 100% is displayed.

- **Margin**

- Indicates the margin to the limit. For each order, the margin is derived from the following equation using the limits and measured values displayed in the list.

$$\frac{\text{Limit} - \text{measured value}}{\text{Limit}} \times 100$$

- The margin only applies to harmonic current values.
- The color of the values changes depending on whether or not you select “The margin degree is used” check box described in section 7.4.
 - When the Margin Degree Is Used
 - Blue indicates that a value has exceeded the margin that you specified according to the procedure in section 7.4.
 - Red indicates that a value is at or below the margin that you specified according to the procedure in section 7.4.
 - When the Margin Degree Is Not Used
 - Values are displayed in black.

Bar Graphs

- **Bar Graph of Harmonic Current or Voltage**

The software displays the instantaneous values acquired within the measurement time for each harmonic order.

- **Bar Graph of Harmonic Phase Angles**

Bar graphs of the phase angle of the harmonic current with respect to the fundamental current for each order can be displayed. However, the phase angle with respect to the fundamental voltage is displayed on the bar graph for the fundamental current.

- When the harmonic phase is leading the fundamental current, a positive phase angle is indicated; when the harmonic phase is lagging the fundamental current, a negative phase angle is indicated.
- When the fundamental current is leading the fundamental voltage, a negative phase angle is indicated; when the fundamental current is lagging the fundamental voltage, a positive phase angle is indicated.

8.2 Setting the Display of the Test Preview

Measured Value Lists

For explanations of these terms, see section 1.5.

- **Sigma W**

Sigma W is the active power for all grouped phases (all measured input elements).

Note

- When applying the power ratio limit on Class C or D multi-phase equipment, the harmonic current per watt derived from the total active power (Sigma W) of all phases (three phases if three-phase) and the power ratio limit are compared and evaluated.
 - Equipment whose Sigma W exceeds 600 W is considered Class A equipment under the standard. Use caution because the software makes evaluations using the class selected in standard and measurement environment settings (see section 7.3).
-

- **Set P, Set Fund I, and Set PF**

For Set P, the power value (see section 3.5) specified in advance is displayed when making Class C or D evaluations.

For Set Fund I and Set PF, the fundamental current and power factor values (see section 7.3) specified in advance are displayed respectively when making Class C evaluations.

8.3 Setting the Display of the List Preview

Procedure

An Example of the List Preview

For information about the functions of toolbar icons other than those listed below, see section 8.2.

Turning Each of the Measured Value Lists (Columns) ON and OFF

The diagram illustrates the relationship between different measurement categories and their corresponding icons in the software interface. The icons are arranged in a grid, and lines connect them to their respective labels:

- Harmonic
- Harmonic Subgroup
- Harmonic Group
- Interharmonic Subgroup
- Interharmonic Group

The screenshot shows the software interface with the 'List' menu open. The 'List' menu contains several icons corresponding to the measurement categories. The 'Harmonic' icon is selected, and the 'List' menu is open, showing the 'List' menu with the 'List' menu open. The 'List' menu contains several icons corresponding to the measurement categories. The 'Harmonic' icon is selected, and the 'List' menu is open, showing the 'List' menu with the 'List' menu open.

Ord.	Measu...	Measu...	Measu...	Measu...	Measu...	Limit
1	0.50...	0.50...	0.50...	0.0000	0.0000	
2	0.00...	0.00...	0.00...	0.0001	0.0002	1.62...
3	0.19...	0.19...	0.19...	0.0002	0.0002	3.45...
4	0.00...	0.00...	0.00...	0.0001	0.0002	0.64...
5	0.02...	0.02...	0.02...	0.0002	0.0002	1.71...
6	0.00...	0.00...	0.00...	0.0001	0.0001	0.45...
7	0.02...	0.02...	0.02...	0.0001	0.0001	1.15...
8	0.00...	0.00...	0.00...	0.0001	0.0001	0.34...
9	0.01...	0.01...	0.01...	0.0001	0.0001	0.60...
10	0.00...	0.00...	0.00...	0.0001	0.0001	0.27...
11	0.00...	0.00...	0.00...	0.0001	0.0001	0.49...
12	0.00...	0.00...	0.00...	0.0002	0.0002	0.23...
13	0.01...	0.01...	0.01...	0.0001	0.0001	0.31...
14	0.00...	0.00...	0.00...	0.0001	0.0001	0.19...
15	0.00...	0.00...	0.00...	0.0000	0.0001	0.22...
16	0.00...	0.00...	0.00...	0.0003	0.0003	0.17...
17	0.00...	0.00...	0.00...	0.0001	0.0001	0.19...
18	0.00...	0.00...	0.00...	0.0003	0.0003	0.15...
19	0.00...	0.00...	0.00...	0.0001	0.0001	0.17...
20	0.00...	0.00...	0.00...	0.0002	0.0002	0.13...
21	0.00...	0.00...	0.00...	0.0001	0.0001	0.16...
22	0.00...	0.00...	0.00...	0.0003	0.0003	0.12...
23	0.00...	0.00...	0.00...	0.0001	0.0001	0.14...
24	0.00...	0.00...	0.00...	0.0003	0.0003	0.11...
25	0.00...	0.00...	0.00...	0.0002	0.0002	0.13...
26	0.00...	0.00...	0.00...	0.0004	0.0004	0.10...
27	0.00...	0.00...	0.00...	0.0002	0.0002	0.12...
28	0.00...	0.00...	0.00...	0.0004	0.0004	0.09...
29	0.00...	0.00...	0.00...	0.0002	0.0003	0.11...
30	0.00...	0.00...	0.00...	0.0009	0.0009	0.09...
31	0.00...	0.00...	0.00...	0.0002	0.0002	0.10...
32	0.00...	0.00...	0.00...	0.0005	0.0005	0.08...
33	0.00...	0.00...	0.00...	0.0002	0.0003	0.10...
34	0.00...	0.00...	0.00...	0.0016	0.0016	0.08...
35	0.00...	0.00...	0.00...	0.0002	0.0002	0.09...
36	0.00...	0.00...	0.00...	0.0005	0.0005	0.07...
37	0.00...	0.00...	0.00...	0.0002	0.0003	0.09...
38	0.00...	0.00...	0.00...	0.0000	0.0000	0.07...

Element 1
Standard IEC
Class A
Range 300V/25A
Frequency 50.000 Hz
Voltage(rms) 103.22 V
Current(rms) 0.5449 A
Power P 52.074 W
Power S 56.246 VA
PF 0.9258
V THD 1.48 %
V THDS 1.48 %
V THDG 1.48 %
A THD 39.89 %
A THDS 39.89 %
A THDG 39.90 %
P THD 0.04 %
THC 0.2020 A
POHC 0.0140 A
POHC Limit 0.2514 A
Sigma W 52.07 W
Sigma PF 0.9258
Set P -----
Set Fund I -----
Set PF -----

For details on the numerical lists, see section 8.2.

8.4 Setting the Display of the Bar Preview

Procedure

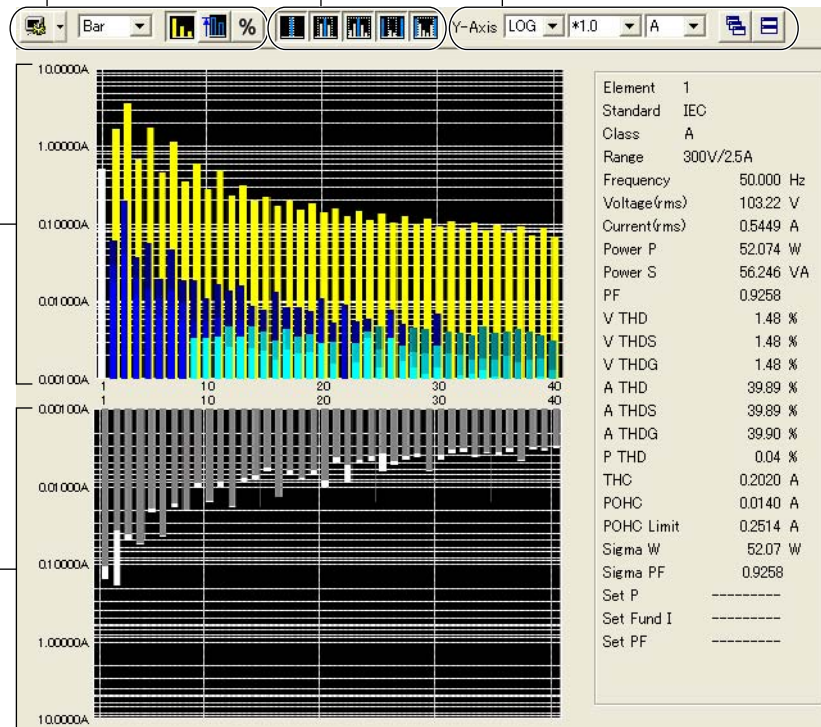
An Example of the Bar Preview

The harmonic, harmonic group, harmonic subgroup, and limit displays area

See section 8.2.

See section 8.3.

See section 8.2.



The interharmonic group and interharmonic center subgroup display area*

Appears when the interharmonic group display button  is pressed or when the interharmonic center subgroup button  is pressed.

For details on the bar graph, see section 8.2.

Explanation**Color of Bars**

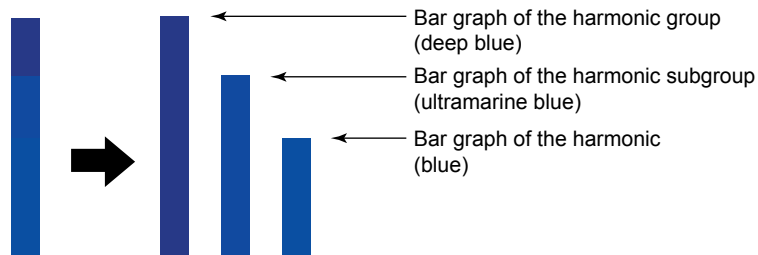
- **Color of the Harmonic bar graph**

See section 8.2.

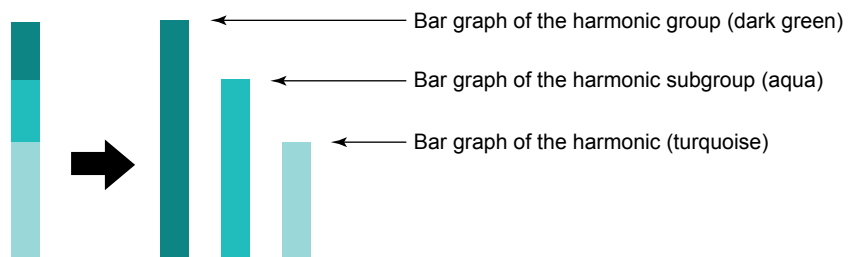
- **Color of the Harmonic Group and Harmonic Subgroup of Current**

The harmonic, harmonic group, and harmonic subgroup are superimposed on the bar graph.

- When the Measured Values Are within the Limit

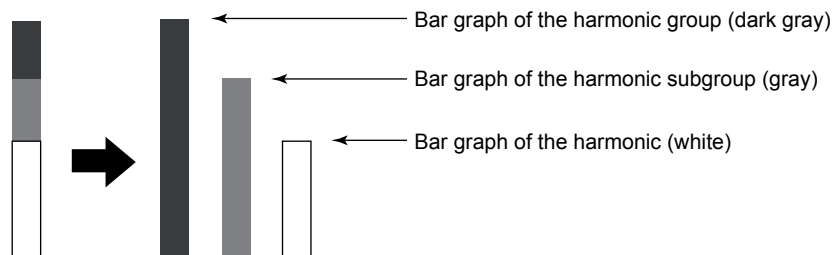


- When Evaluation Is Not Made Because the Measured Data Is Less than the Larger of the Two Values, 0.6% of the Mean Rms Current and 5 mA



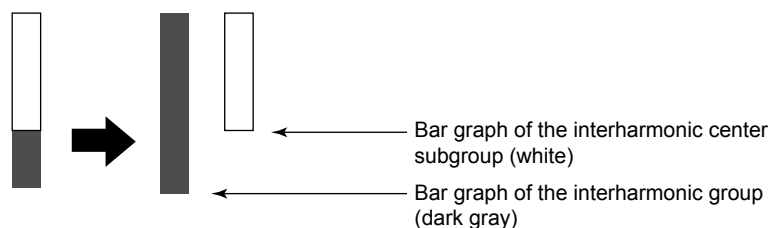
- **Color of the Harmonic Group and Harmonic Subgroup of Voltage**

The harmonic, harmonic group, and harmonic subgroup are displayed as shown below. There is no need to compare with the limit to make evaluations.



- **Color of the Interharmonic Group and Interharmonic Center Subgroup**

The interharmonic group and interharmonic center subgroup are displayed as shown below. There is no need to compare with the limit to make evaluations. Bar graph of the interharmonic center

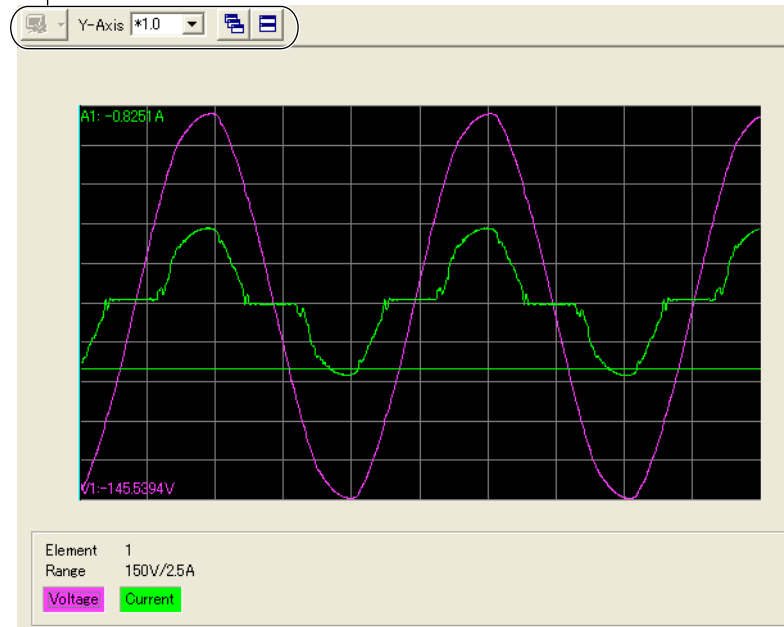


8.5 Setting the Display of the Wave Preview

Procedure

An Example of the Waveforms Preview

See section 8.2.



Showing/Hiding Specific Waveforms

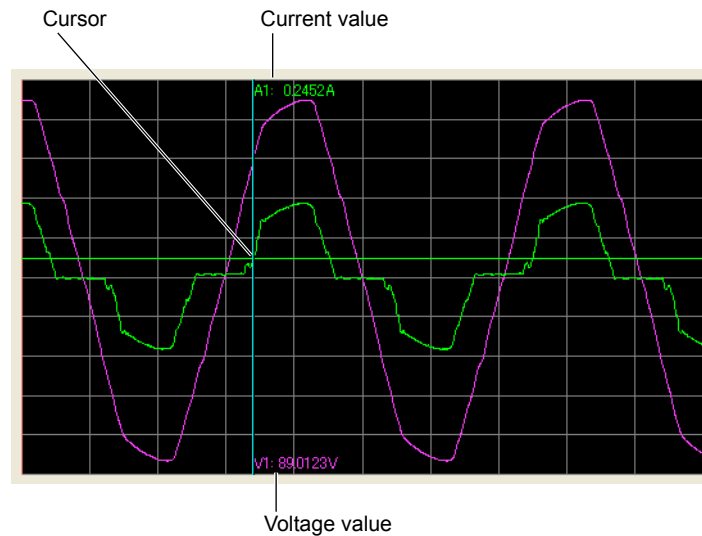
You can show or hide an element's voltage or current waveform by clicking on the Voltage and Current buttons for each element in the show/hide box.

Show/hide box (an example of the three-phase input)

Element	1	Element	2	Element	3
Range	300V/30A	Range	300V/30A	Range	300V/30A
Voltage	☒	Voltage	☒	Voltage	☒
Current	☒	Current	☒	Current	☒

Using the Cursor to Display Current and Phase Angle Values

When you click an area of the waveform, a cursor will appear there. The current and phase angle values at the cursor position will be displayed.



Explanation

Changing the Y-Axis Scale (the Size of the Voltage and Current Waveforms)

- Linear scaling is used. Logarithmic scaling is not supported.
- The measurement range specified for the WT is used as the maximum value, 1.0, on the Y-axis (see section 7.2 for details on setting the range).

Display Colors

The following colors are assigned to the waveforms of each input element in order, starting with the lowest numbered element. If you are previewing the waveforms of elements 1, 2, and 3, the following colors will be assigned to the element's voltage and current waveforms:

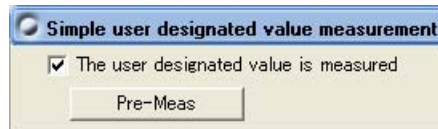
Element	Voltage Waveform	Current Waveform
Element 1	Pink	Bright green
Element 2	Blue	Yellow
Element 3	Turquoise	Red

* The colors and corresponding names are the same as those in Microsoft Word and Microsoft Excel.

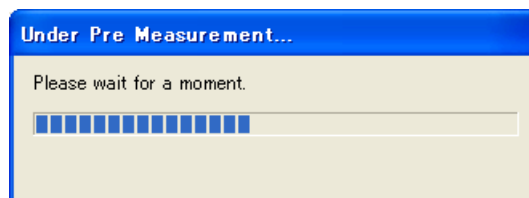
8.6 Making Simple User Designated Value Measurement

Procedure

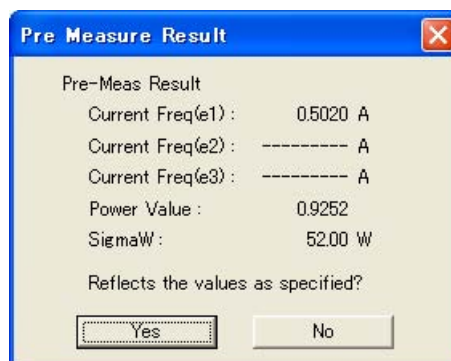
1. Select the  icon in the menu area. The Measure submenu appears. For general information about the Measure submenu, see section 8.1.
2. Select the **user designated value is measured** check box.



3. Click **Pre-Meas**. A message will appear to indicate that pre-measurement is taking place.



After 10 seconds of pre-measurement, the Pre Measure Result message appears.



4. Select whether or not to use the results of pre-measurement to set the fundamental current, circuit power factor, and power values described in section 7.3. If you select Yes, the values will be set to the pre-measured values.

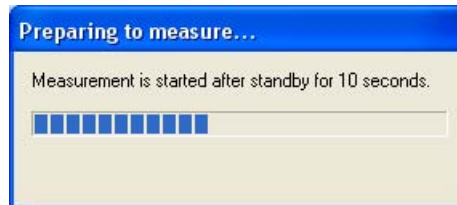
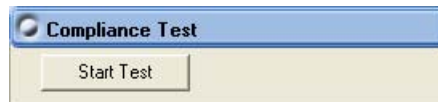
8.7 Making Harmonic Measurements

Procedure

1. Select the  icon in the menu area. The Measure submenu appears. For general information about the Measure submenu, see section 8.1.

Starting a Test

2. Click **Start Test**. A dialog box opens that indicates that you have to wait before measurement starts. Then measured harmonic values appear in the measured harmonic values lists and bar graphs.



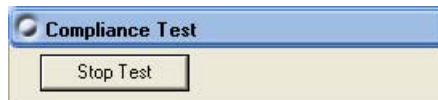
Stopping a Test

- **Stopping Automatically**

The software will stop testing automatically once the specified measurement time has been reached.

- **Stopping Manually**

Click **Stop Test**. If the WT is measuring, it will stop when measurement ends normally and data has been acquired.



Once the test is finished, the overall judgment appears.



The overall judgment also appears in the information area.



Explanation**An Example of the Setting and Display Area during a Compliance Test****Sampled data count**

One sample count is equivalent to 200 ms (10 cycles for 50 Hz and 12 cycles for 60 Hz)* worth of measured instantaneous data values. This data is acquired by the software and displayed. In this example, 145 samples have been acquired.

Measure time

The amount of time that has elapsed since the start of measurement/the measurement time set according to the procedure described in chapter 7.

Sample Count : 145/145

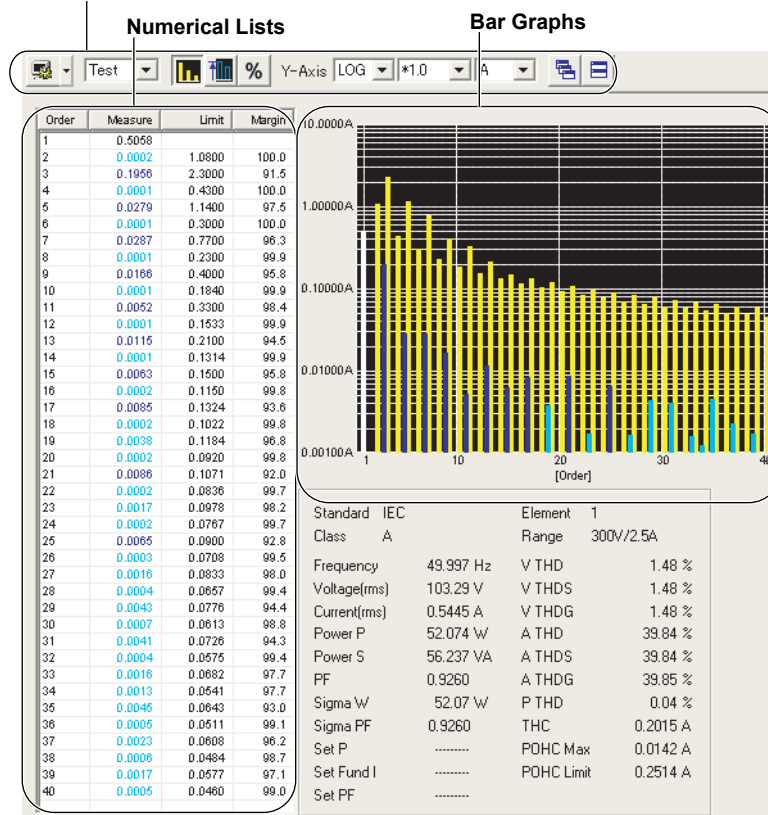
Measure Time :

29.0sec/150sec

* For when the IEC 61000-4-7 edition is set to 2.0 or 2.0 A1. When the IEC 61000-4-7 edition is set to 1.0, the number of cycles is 16 (320 ms at 50 Hz or 267 ms at 60 Hz).

Toolbar

See section 8.2.



Measured value lists
For explanations of these terms, see section 1.5.

Selecting the display format of the setting and display area

Only Test(Bar+List) is valid. Even if you select a different display format (Bar or List) by clicking one of the display format selection icons in the toolbar, measured data will not be displayed.

Judgment

If all of the elements that are tested pass, PASS appears. Otherwise, FAIL appears.



PASS

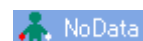


FAIL



FAIL (Margin Short)

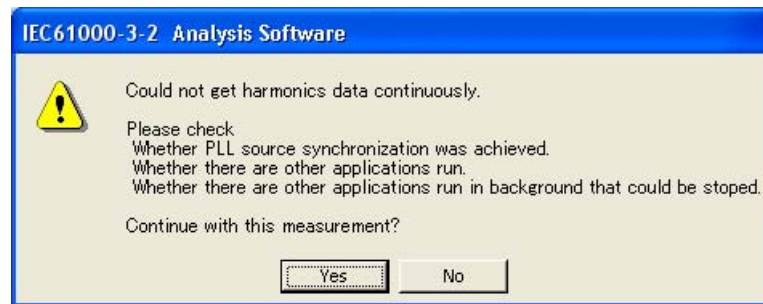
The limit has not been exceeded, but the margin specified in section 7.4 has been exceeded.



NoData

Error Messages during Measurement

The following error message may appear when measurement is executed in Compliance Test.



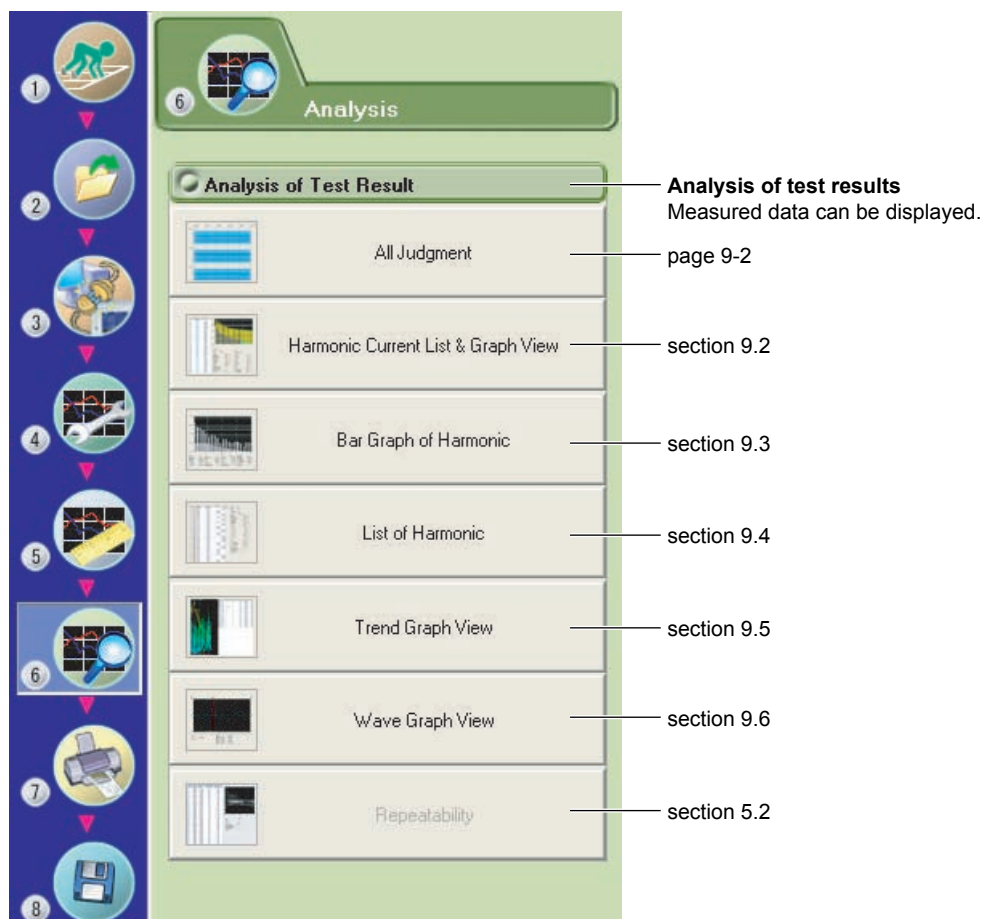
This software retrieves large amount of measured data from the WT. The error message may appear if the CPU on the PC is overloaded and cannot keep up with the data transfer. Lighten the load placed on the CPU on the PC by checking the points listed below.

- Do not operate or run other programs.
- Close memory-resident programs (turn them OFF).
- Disable the standby mode.
- Use the software on a PC that satisfies the system requirements given in section 1.2.

9.1 Displaying a Graph of All Judgments

Procedure

1. Select the  icon in the menu area. The Analysis submenu appears.



Window arrangement buttons
For details, see chapter 12.



Displays cascaded window



Displays tiled windows

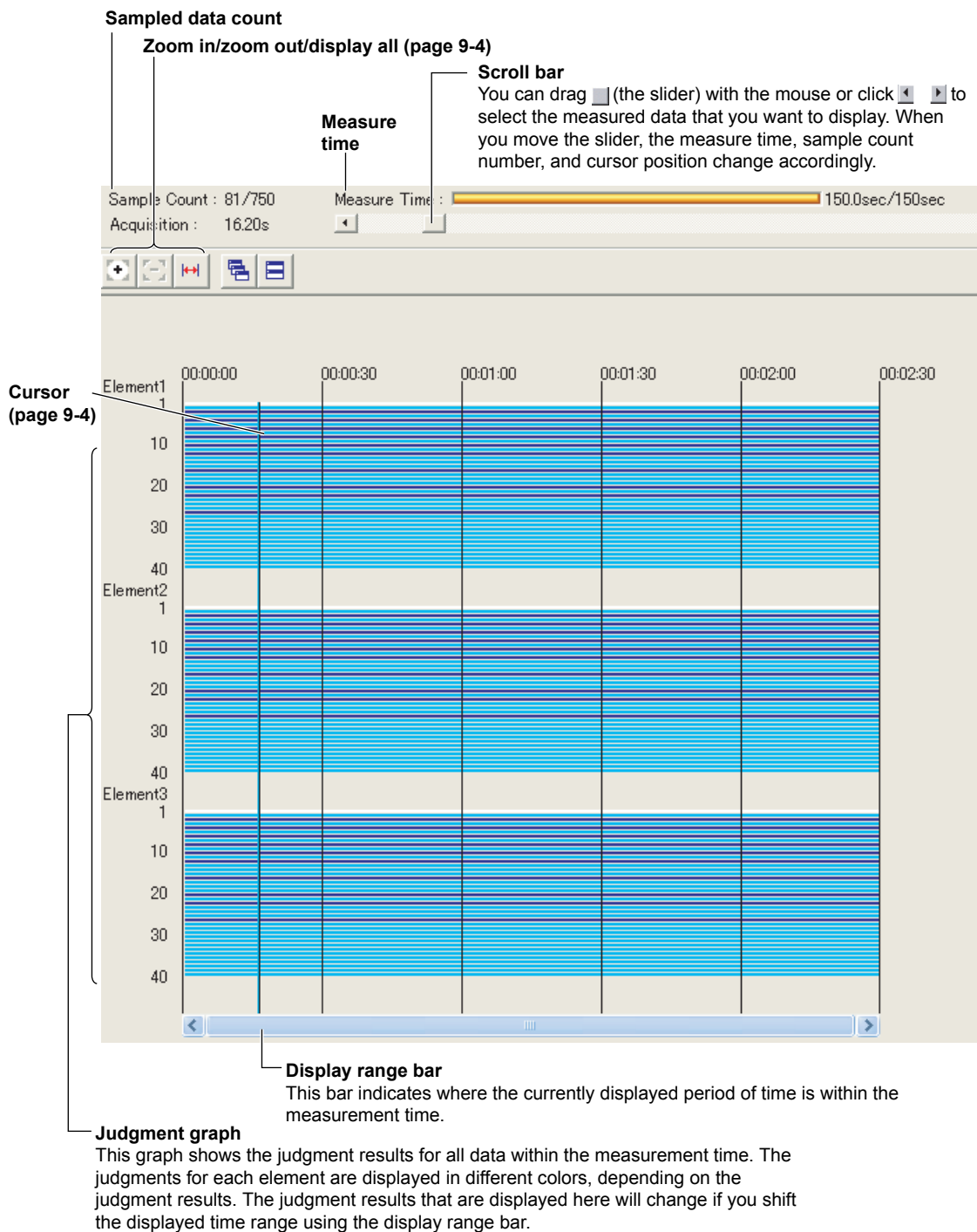
Loss of Measured Data

While in the Analysis window, if you click the Measure icon and switch to the Measure window, the measured data will be discarded. Save the data if you do not want it to be discarded (see chapter 11 for information on how to save data).

9.1 Displaying a Graph of All Judgments

Displaying a Graph of All Judgments

2. Click **All Judgment**. A graph of all judgments appears.



Explanation

The software displays a graph that shows whether each of the values for current harmonic that are measured within the specified measurement time are within their limits according to the settings described in section 7.3, “Setting the WT3000 Judgment Conditions.”

The input elements that are measured vary depending on the Wiring Pattern setting (see chapter 7 for details). The software makes judgments for every input element that is set in the Wiring Pattern setting.

Evaluation Colors

The table below describes what the colors in the evaluation graph indicate. Condition 1, Condition 2, 200% short-term relaxation, and POHC relaxation conditions that appear in the table are defined below.

- **Condition 1**

The maximum harmonic current over the measurement time is within 1.5 times the specified limit. Evaluation is made on each order.

- **Condition 2**

The mean harmonic current over the measurement time is within the specified limit. Evaluation is made on each order.

- **200% Short-Term Relaxation Conditions**

If all of the following conditions are met, up to 200% of the specified limits is permitted.

- The EUT belongs to Class A for harmonics.
- The excursion beyond 150 % of the applicable limits lasts less than 10 % of the test observation period or in total 10 min (within the test observation period), whichever is smaller.
- The average value of the harmonic current, taken over the entire test observation period, is less than 90 % of the applicable limits.

- **POHC Relaxation Condition**

If the maximum value of the sum of partial odd harmonic currents (POHC) of order above and including 21 is less than the specified POHC limit, the mean of the odd harmonic currents of order above and including 21 is permitted to be 1.5 times the specified limit.

9.1 Displaying a Graph of All Judgments

	Blue Both Conditions 1 and 2 are met
	White A limit has not been specified.
	Bright green • Condition 1 is met. • Condition 2 is not met. • POHC Relaxation Condition is met.
	Yellow • Condition 1 is met. • Condition 2 is not met. • POHC Relaxation Condition is not met.
	Green • Condition 1 is not met. • Condition 2 is met. • The 200% short-term relaxation conditions are met.
	Orange • Condition 1 is not met. • Condition 2 is met.
	Pink • Condition 1 is not met. • Condition 2 is not met. • POHC Relaxation Condition is met.
	Red None of the Condition 1, Condition 2, 200% short-term relaxation, or POHC relaxation conditions is met.
	Turquoise The measured data is less than the larger of the two values, 0.6% of the mean rms current and 5 mA.
	Aqua • None of the Condition 1, Condition 2, 200% short-term relaxation, or POHC relaxation conditions is met. • Excluded from applying the limits because the maximum active power is less than the minimum power (75 W or 50 W) for applying the limits or set to Infinity.

* The names of the sample colors of Microsoft Word or Excel are used for the names of the colors.

If the evaluation of all the data points over the measurement time is blue, bright green, green, turquoise, or aqua, Judgment on the Overall Evaluation Graph window indicates PASS. If the evaluation of any data point is yellow, orange, pink, or red, Judgment indicates FAIL.

Zooming In and Out



The Zoom In and Zoom Out Icons

Each time you click one of the zoom icons, the software will zoom in or zoom out from the cursor. The zoom levels are:

- 25 s
- 50 s
- 100 s (1 min 40 s)
- 200 s (3 min 20 s)
- 400 s (6 min 40 s)
- 800 s (13 min 20 s)
- 1600 s (26 min 40 s)
- 3200 s (53 min 20 s)
- ⋮

The entire measurement time

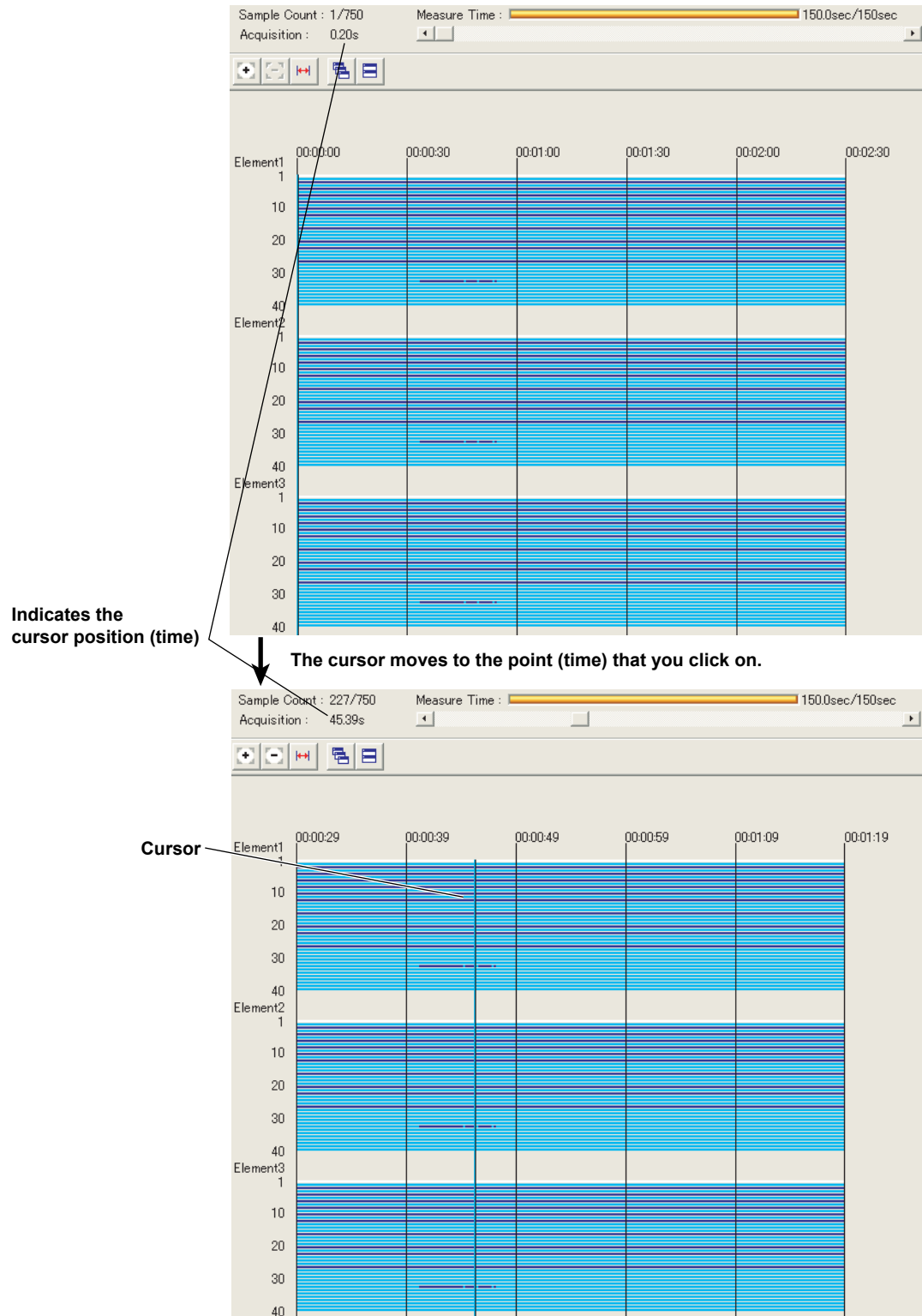
If a zoom out would cause the zoomed display to show more than 75% of the measurement time, the entire measurement time will be displayed. For example, if the measurement time is 1 h, the 3200 s (53 min 20 s) level will not be displayed because it would show 89% of the entire measurement time.

9.1 Displaying a Graph of All Judgments

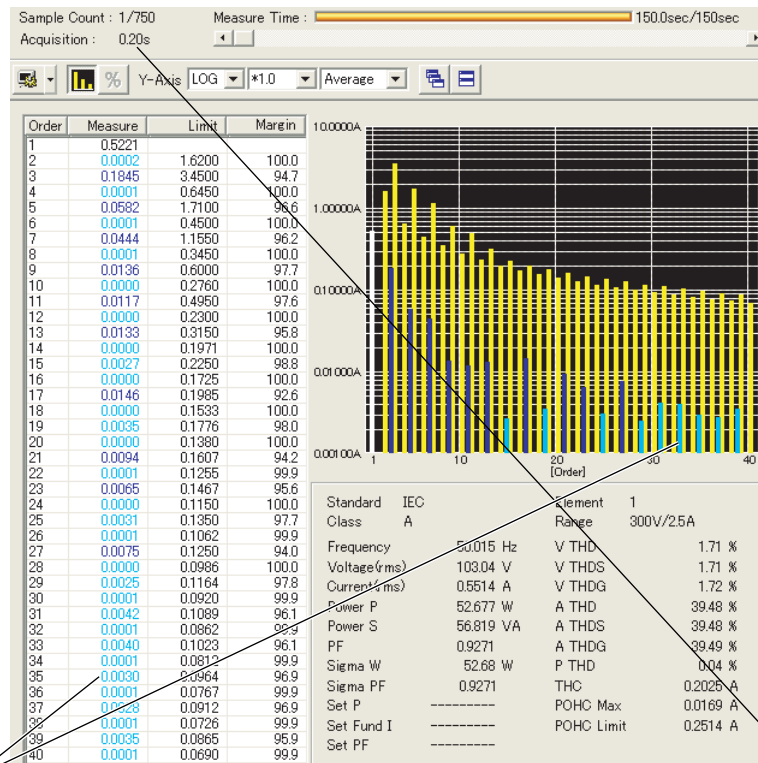
Using the Graph of All Judgments Effectively

You can select specific measured data that you want to examine more closely on the graph of all judgments to display bar graphs and lists of the measured data. The following example shows how to display an harmonic list and bar graph for element 1.

1. Use the mouse to click the appropriate area. The cursor will shift to the time position that you click.

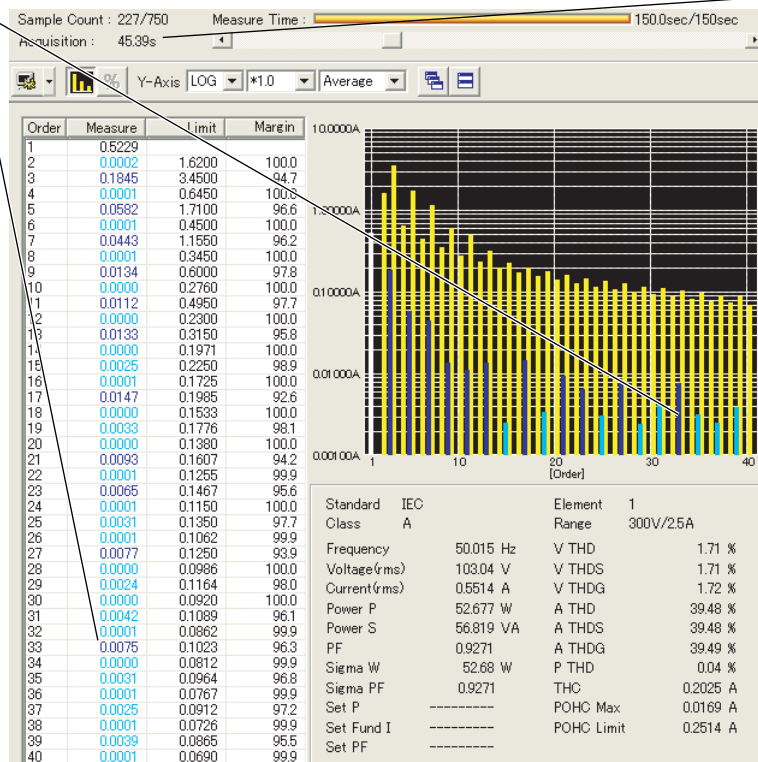


- In the submenu, select Harmonic Current List and Graph View, and then select Instant from the list in the setting and display area. A bar graph for the instantaneous values from the cursor position will appear.
For detailed information about the bar graph display, see section 9.3.



The level of the 33th harmonic order changes, and the judgment changes from blue to turquoise.

Indicates the cursor position (time)



9.2 Displaying a List and Graph of Harmonic Current Values

Procedure

1. Select the  icon in the menu area. The Analysis submenu appears. For general information about the Analysis submenu, see section 9.1.

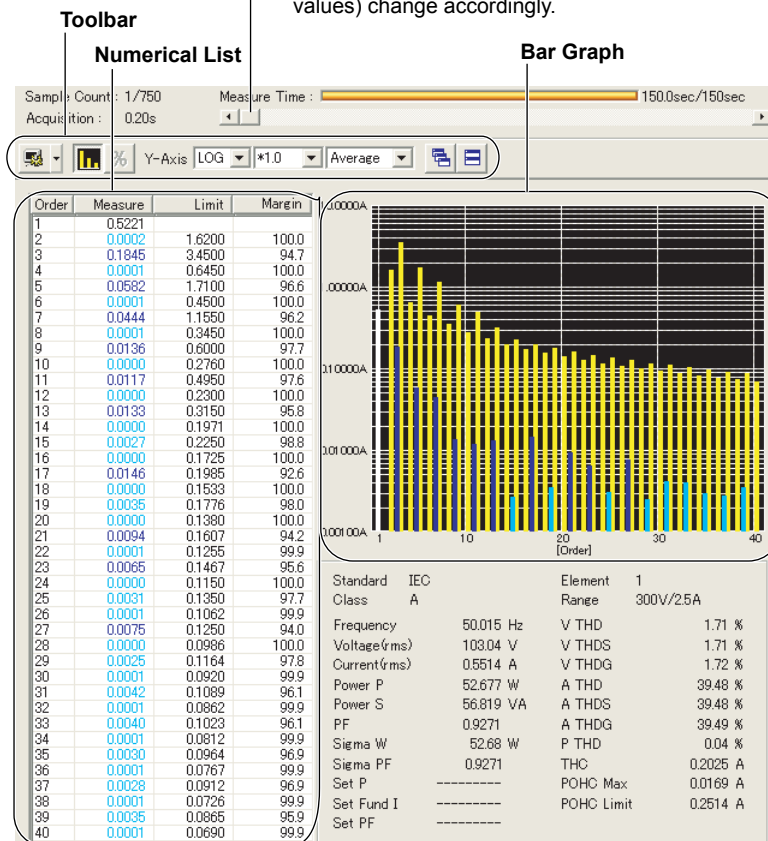
Displaying a List and Graph of Harmonic Current Values

2. Click **Harmonic Current List and Graph View**. A list and graph of harmonic current values appear.



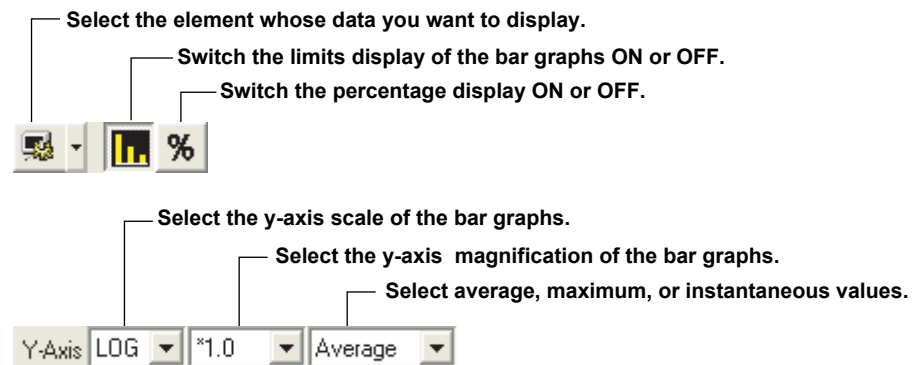
Scroll bar

When displaying instantaneous values, you can drag  (the slider) with the mouse or click   to select the measured data that you want to display. When you move the slider, the measure time, sample count number, and displayed measured data (instantaneous values) change accordingly.



9.2 Displaying a List and Graph of Harmonic Current Values

Toolbar



Selecting the Element Whose Data You Want to Display

Click . If input elements 1 to 3 are being measured, as you click the icon, the displayed data will switch from element 1, to element 2, to element 3, to element 1, and so on. Click ▼ to select an element directly.

Switching the Limits Display of the Bar Graphs ON or OFF.

Click  to select whether or not to display the limits in the bar graph. The limits are displayed using yellow bars. Limits are only applied to harmonic current values. There are no specified limits for voltages or phase angles. So limits for these values are not displayed.

Switching the Percentage Display ON or OFF.

Click  to turn the percentage display ON and display the following items as percentages.

• Numerical lists

- The relative harmonic data or content of each order
- Limits

• Bar graphs

- The Y-axis scale

• Measured value lists

- THC
- POHC
- POHC maximum
- POHC limit

- The percentage display is applied only to harmonic current.
- Percentage display is valid when the class is set to C in the test conditions and one of the following conditions is met:
 - You set the power class to "> 25W."
 - You set the power class to "<= 25W" and you set the limits to "judge with current wave pattern of 3rd&5th."

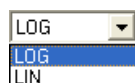
9.2 Displaying a List and Graph of Harmonic Current Values

- On the Percentage Display, The relative harmonic content of current of each order can be displayed on bar graphs with the specified fundamental current (fundamental current specified in advance when making Class C evaluation, see section 3.5) taken to be 100%.
- When limits are specified by the relative harmonic content of order 3 and 5 such as the limits for Class C equipment with active input power less than or equal to 25 W, bars corresponding to the magnitude of the values are displayed.
- When the magnification of the Y-axis scale is *1.0, the maximum scale of Y-axis is 100.00%.

Selecting the Y-Axis (Current Magnitude) Scale

- **Selecting the Type of Y-Axis Scale**

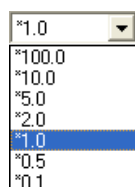
Select LIN (linear) or LOG (logarithmic).



- **Selecting the Magnification**

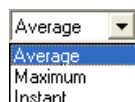
When the type of scale is LIN, select *100.0, *10.0, *5.0, *2.0, *1.0, *0.5, or *0.1.

When the type of scale is LOG, select *100.0, *10.0, *1.0, or *.1.



Selecting Average, Maximum, or Instantaneous Values

Select Average, Maximum, or Instant.



Explanation**List Display****Limit**

- The limits specified in the applicable standard are displayed in a list for each order.
- The limits are applied only to harmonic current.
- If the Percentage Display check box is selected, the relative harmonic content of the limit of each order can be displayed with the specified fundamental current (fundamental current specified in advance when making Class C evaluation, see section 7.3) taken to be 100%.
- When limits are specified by the relative harmonic content of order 3 and 5 such as the limits for Class C equipment with active input power less than or equal to 25 W, the current value converted from the relative harmonic content of order 3 and 5 with the fundamental current specified in advance (see section 7.3) taken to be 100% is displayed.

Margin

Indicates the margin to the limit. For each order, the margin is derived from the following equation using the limits and measured values displayed in the list.

$$\frac{\text{Limit} - \text{measured value}}{\text{Limit}} \times 100$$

- The margin only applies to harmonic current values.
- The color of the values changes depending on whether or not you select "The margin degree is used" check box described in section 7.4.
 - When the Margin Degree Is Used
 - Blue indicates that a value has exceeded the margin that you specified according to the procedure in section 7.4.
 - Red indicates that a value is at or below the margin that you specified according to the procedure in section 7.4.
 - When the Margin Degree Is Not Used
 - Values are displayed in black.

Bar Graph Display

Average/Maximum/Instantaneous Value

The software displays bar graphs and lists in three ways depending on whether you select to display average, maximum, or instantaneous values. This section explains the differences between each display.

- **Average value display**

- Values and bars for each harmonic order
The software averages the measured data (instantaneous values) of each harmonic order that is acquired within the measurement time and displays those averages.

- Measured items that appear to the right of the list
The software averages the values acquired for each measured item within the measurement time and displays those averages.

- Limit values and bars
The software displays numbers and yellow bars that indicate the values of the limits.

- **Maximum value display**

- Values and bars for each harmonic order
The software finds and displays the maximum value from each harmonic order's measured values by comparing the instantaneous values that have been acquired within the measurement time.

- Items that appear to the right of the list
The software finds and displays the maximum value for each measured item by comparing the instantaneous values that have been acquired within the measurement time.

- Limit values and bars
The software displays numbers and yellow bars that are 1.5 times greater than the values of the limits.

- **Instantaneous value display**

- Values and bars for each harmonic order
The software displays the instantaneous values acquired within the measurement time for each harmonic order.

- Measured items that appear to the lower right of the list
The software displays the instantaneous values acquired within the measurement time.

- Limit values and bars
The software displays numbers and yellow bars that are 1.5 times greater than the values of the limits.

- Selecting values
Use the scroll bar to change the displayed instantaneous values.

Note

When the software is displaying average or maximum values, using the scroll bar will have no effect on the harmonic current list and graph displays.

9.2 Displaying a List and Graph of Harmonic Current Values

Colors of the numerical lists and bar graphs of the current

The lengths for the bar graphs are determined by the size of the measured data that they represent. The meanings of bar colors are as follows:

	Blue Limit not exceeded.
	Bright green (applies only to average list) When the same conditions of bright green on page 9-4 applies.
	Green (applies only to maximum list and instantaneous list) When the same conditions of green on page 9-4 applies.
	Red Exceeds the limit.
	Yellow (applies only to bar graph) The limit specified by the standard.
	Black (applies only to numerical list) No applicable limit is specified. (The measured value of the fundamental frequency and orders that are not applicable is displayed in black.)
	White No applicable limit is specified. (The bar graph of the fundamental frequency and orders that are not applicable is displayed in white.)
	Turquoise The measured data is less than the larger of the two values, 0.6% of the mean rms current and 5 mA.
	Aqua Limit exceeded. Excluded from applying the limits because the maximum active power is less than the minimum power (75 W or 50 W) for applying the limits or set to Infinity.

* The names of the sample colors of Microsoft Word or Excel are used for the names of the colors.

Colors of the numerical lists and bar graphs of the voltage and phase angle

There are no voltage or phase angle limits. Bar graphs of harmonic voltage or phase angle are displayed in white. The values displayed in the list are black.

Measured Value Lists

For explanations of these terms, see section 1.5.

- **Sigma W**
Sigma W is the active power for all grouped phases (all measured input elements).

Note

- When applying the power ratio limit on Class C or D multi-phase equipment, the harmonic current per watt derived from the total active power (Sigma W) of all phases (three phases if three-phase) and the power ratio limit are compared and evaluated.
- Equipment whose Sigma W exceeds 600 W is considered Class A equipment under the standard. Use caution because the software makes evaluations using the class selected in standard and measurement environment settings (see section 7.3).

- **Set P, Set Fund I, and Set PF**
For Set P, the power value (see section 3.5) specified in advance is displayed when making Class C or D evaluations.
For Set Fund I and Set PF, the fundamental current and power factor values (see section 7.3) specified in advance are displayed respectively when making Class C evaluations.

9.2 Displaying a List and Graph of Harmonic Current Values

Mutual Relationship of Graphs and Lists

When using the scroll bar to select the time of acquisition and displaying the measured data on a graph window or list window displaying a certain instantaneous value, the other graph window or list window also shows the measured data at the same time of acquisition.

9.3 Displaying a Harmonic Bar Graph

1. Select the  icon in the menu area. The Analysis submenu appears. For general information about the Analysis submenu, see section 9.1.

Displaying a Harmonic Bar Graph

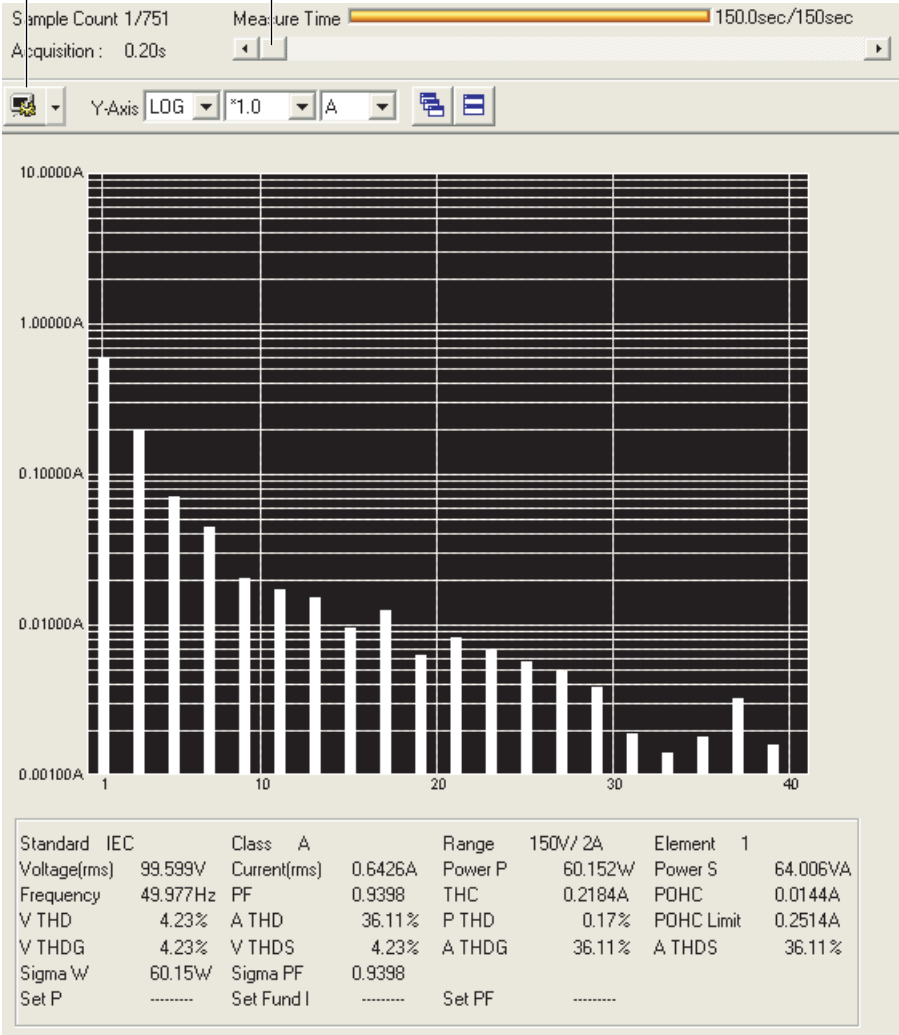
2. Click **Bar Graph of Harmonic**. A harmonic bar graph appears.



Select the element whose data you want to display.

Scroll bar

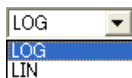
You can drag  (the slider) with the mouse or click   to select the measured data that you want to display. When you move the slider, the measure time, sample count number, and displayed measured data (instantaneous values) change accordingly.



Changing the Y-Axis Scale (the Size of the Current Waveform)

- **Selecting the Type of Y-Axis Scaling**

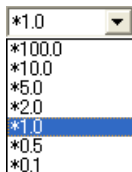
Select **LIN** (linear) or **LOG** (logarithmic).



- **Selecting the Scale**

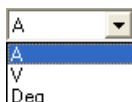
When the scaling type is LIN, you can select ***100.0**, ***10.0**, ***5.0**, ***2.0**, ***1.0**, ***0.5**, or ***0.1**.

When the scaling type is LOG, you can select ***100.0**, ***10.0**, ***1.0**, or ***0.1**.



Selecting the Measurement Function to Display

Select **A**, **V**, or **Deg** (for current, voltage, or phase angle).



Explanation

Bar Graph of Harmonic Current or Voltage

The software displays the instantaneous values acquired within the measurement time for each harmonic order.

Bar Graph of Harmonic Phase Angles

Bar graphs of the phase angle of the harmonic current with respect to the fundamental current for each order can be displayed. However, the phase angle with respect to the fundamental voltage is displayed on the bar graph for the fundamental current.

- When the harmonic phase is leading the fundamental current, a positive phase angle is indicated; when the harmonic phase is lagging the fundamental current, a negative phase angle is indicated.
- When the fundamental current is leading the fundamental voltage, a negative phase angle is indicated; when the fundamental current is lagging the fundamental voltage, a positive phase angle is indicated.

Bar Graph Display Color

The bar graph is displayed in white.

Note

This bar graph does not display limits.

Selecting Instantaneous Values

Use the scroll bar to change the displayed instantaneous values.

9.4 Displaying a List of Measured Harmonic Values

1. Select the  icon in the menu area. The Analysis submenu appears. For general information about the Analysis submenu, see section 9.1.

Displaying a List of Measured Harmonic Values

2. Click **List of Harmonic**. A list of measured harmonic (instantaneous) values appears.



Select the element whose data you want to display.

Scroll bar

You can drag  (the slider) with the mouse or click   to select the measured data that you want to display. When you move the slider, the measure time, sample count number, and displayed measured data (instantaneous values) change accordingly.

Sample Count 1/751 Measure Time  150.0sec/150sec
 Acquisition : 0.20s

Order	Voltage	Current	Phase
1	99.5103	0.6044	- 3.2338
2	0.0097	0.0002	- 47.7778
3	1.1672	0.1978	172.1774
4	0.0078	0.0001	98.1320
5	3.5916	0.0718	-172.5704
6	0.0074	0.0001	152.8828
7	1.2732	0.0444	14.7376
8	0.0062	0.0001	- 69.8724
9	0.3505	0.0201	- 35.7702
10	0.0057	0.0001	10.8410
11	1.0343	0.0172	-128.1912
12	0.0063	0.0001	-174.5042
13	0.2227	0.0153	90.4600
14	0.0114	0.0001	- 98.1076
15	0.1404	0.0096	58.6028
16	0.0106	0.0001	6.4659
17	0.5255	0.0125	- 84.4614
18	0.0075	0.0001	66.2833
19	0.4109	0.0062	-145.9786
20	0.0069	0.0001	176.6561
21	0.0651	0.0081	118.2499
22	0.0065	0.0001	- 87.3873
23	0.0252	0.0068	15.1334
24	0.0065	0.0001	116.4332
25	0.1070	0.0058	- 20.3889
26	0.0056	0.0001	154.9531
27	0.1641	0.0049	-165.1704
28	0.0060	0.0002	- 7.3691
29	0.0802	0.0038	-169.4965
30	0.0052	0.0001	5.7312
31	0.0893	0.0019	45.7083
32	0.0046	0.0002	-166.0961
33	0.0355	0.0014	99.5781
34	0.0061	0.0002	132.2832
35	0.0840	0.0018	- 62.4868
36	0.0051	0.0002	21.6218
37	0.0512	0.0033	- 19.6206
38	0.0042	0.0002	- 45.1142
39	0.0674	0.0016	127.7705
40	0.0043	0.0001	-147.7231

Element	1
Standard	IEC
Class	A
Range	150V/ 2A
Frequency	49.977 Hz
Voltage(rms)	99.599 V
Current(rms)	0.6426 A
Power P	60.152 W
Power S	64.006 VA
PF	0.9398
V THD	4.23 %
V THDS	4.23 %
V THDG	4.23 %
A THD	36.11 %
A THDS	36.11 %
A THDG	36.11 %
P THD	0.17 %
THC	0.2184 A
POHC	0.0144 A
POHC Limit	0.2514 A
Sigma W	60.15 W
Sigma PF	0.9398
Set P	-----
Set Fund I	-----
Set PF	-----

9.5 Displaying a Trend Graph

1. Select the  icon in the menu area. The Analysis submenu appears. For general information about the Analysis submenu, see section 9.1.

Displaying a Trend Graph

2. Click **Trend Graph View**. A trend graph appears.



Configuring a Trend Graph

Show/hide trace settings box (page 9-19)

Auto range

- **When the auto range button is pressed**
The range changes automatically to match the loaded data.
- **When the auto range button is not pressed**
When you click the Upper or Lower column headings, a combo box appears that allows you to set the display range upper and lower limits for each trace.

Grid

You can select the type of grid that will be displayed in the trend display area from Dotted, Line, and None.

- Dotted: A grid with dotted lines is displayed.
- Line: A grid with solid lines is displayed.
- None: No grid is displayed.

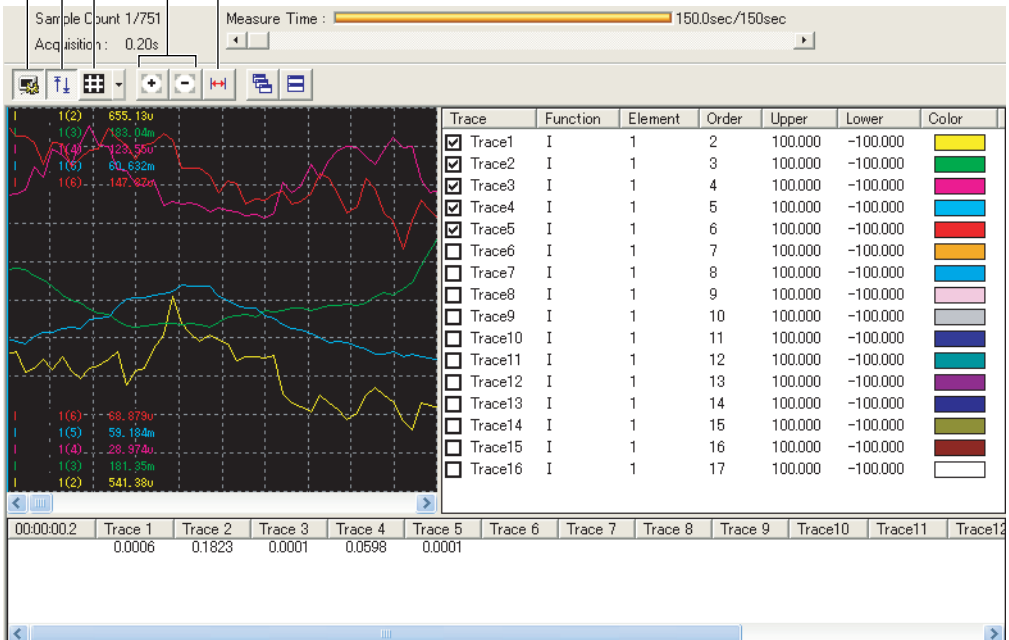
Zoom in/zoom out (see page 9-21)

Display all: Displays the whole measurement time

Display range upper limits

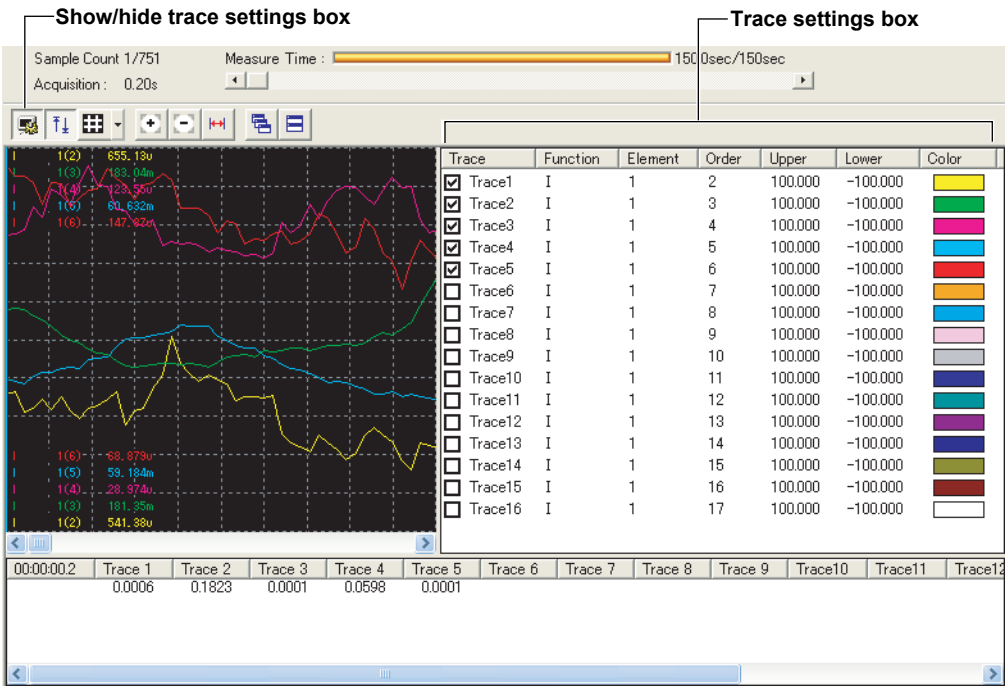
Display range lower limits

Cursor (page 9-21).

A screenshot of the Trend Graph View interface. The top bar shows "Sample Count 1/751" and "Acquisition: 0.20s". A "Measure Time" slider is set to "150.0sec/150sec". Below the bar is a toolbar with icons for grid, zoom, and other functions. The main display area shows a graph with multiple traces. On the left, there are labels for "Display range upper limits" and "Display range lower limits" pointing to the y-axis. At the bottom, there is a "Cursor" label pointing to the x-axis. On the right, there is a table with columns: Trace, Function, Element, Order, Upper, Lower, and Color. The table lists 16 traces, with the first five checked. Below the table is a row of buttons for each trace, labeled "Trace 1" through "Trace 12".

Trace	Function	Element	Order	Upper	Lower	Color
☒ Trace1	I	1	2	100.000	-100.000	Yellow
☒ Trace2	I	1	3	100.000	-100.000	Green
☒ Trace3	I	1	4	100.000	-100.000	Magenta
☒ Trace4	I	1	5	100.000	-100.000	Cyan
☒ Trace5	I	1	6	100.000	-100.000	Red
☐ Trace6	I	1	7	100.000	-100.000	Orange
☐ Trace7	I	1	8	100.000	-100.000	Blue
☐ Trace8	I	1	9	100.000	-100.000	Pink
☐ Trace9	I	1	10	100.000	-100.000	Grey
☐ Trace10	I	1	11	100.000	-100.000	Dark Blue
☐ Trace11	I	1	12	100.000	-100.000	Teal
☐ Trace12	I	1	13	100.000	-100.000	Purple
☐ Trace13	I	1	14	100.000	-100.000	Dark Purple
☐ Trace14	I	1	15	100.000	-100.000	Olive
☐ Trace15	I	1	16	100.000	-100.000	Brown
☐ Trace16	I	1	17	100.000	-100.000	White

Configuring Traces



Trace
Select the trends you want to display (select or clear the check boxes).

Function
Select the measurement function to be displayed.

1. Click the **Function** column. A combo box opens.
2. Select the measurement function.

Note
You can select from the following measurement functions.

- U Voltage
- I Current
- P Power
- S Apparent power
- SigmaW Active power of all phases
- SigmaPF Power factor of all phases
- Freq Fundamental frequency of the PLL source
- LAMBDA Power factor
- POHC Sum of odd harmonic currents of order above and including 21
- THC Total harmonic current
- PHI Phase angle

Element
Select the element to be displayed.

1. Click the **Element** column. A combo box opens.
2. Select the element.

Order

Select the harmonic order that you want to display.

1. Click the **Order** column heading. A dialog box appears.
2. Select the harmonic order you want to display.

Upper and Lower

If the Auto Ranging check box is not selected, set the Upper and Lower limit of the display range.

1. Click the **Upper** or **Lower** column. A combo box opens.
2. Set the upper or lower limit value of the display range.

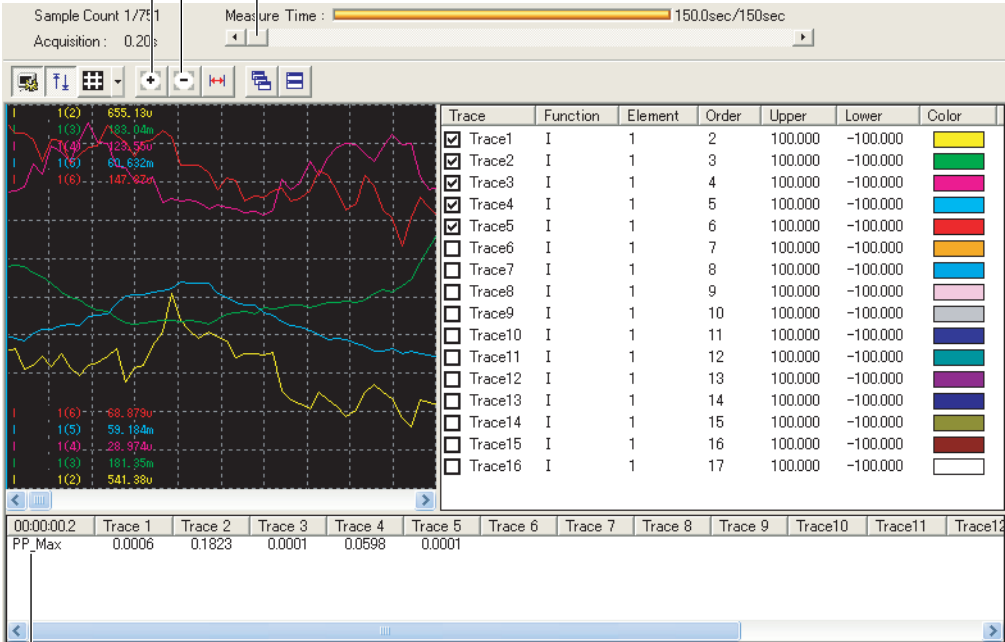
Color

Select the display color of the trend.

1. Click the **Color** column. A combo box opens.
2. Select the display color of the trend.

Zooming In and Zooming Out

- Zoom in**
Click to zoom in. You can zoom in until the trend display area contains 2 s worth of data.
- Zoom out**
Click to zoom out. You can zoom out until the trend display area contains the data for all of the elapsed time.
- Scroll bar**
You can drag (the slider) with the mouse or click to select the measured data that you want to display.



- PP_Max**
In the trend display, if not all the measured values can be displayed because the specified time axis value is set too high, measured values are P-P compressed and displayed.*
When this occurs, PP_Max is displayed here. To display values without P-P compression, zoom in on the time axis.

* P-P Compression (Peak-to-Peak Compression)
In P-P compression, a maximum and minimum value are extracted from the values measured over a given period of time and are used to produce a compressed measured value.
For details, see section 2.7 of the WT3000 User's Manual (IM760301-01E).

- Cursor**
When you click somewhere on the trend display area, a cursor will appear there.
You can move the cursor by dragging it.

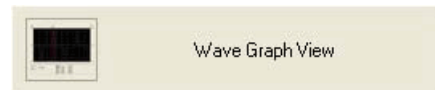
- Slider**
Move along the time axis to the waveform that you want to display.

9.6 Displaying a Waveform Graph

1. Select the  icon in the menu area. The Analysis submenu appears. For general information about the Analysis submenu, see section 9.1.

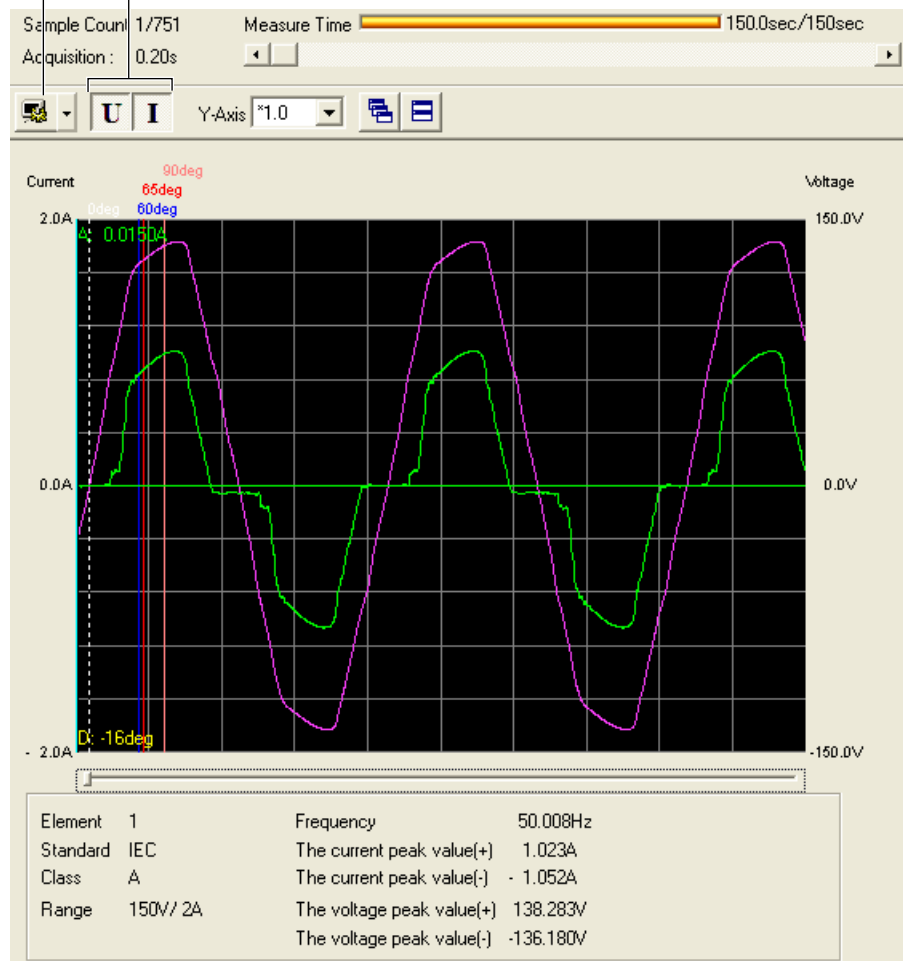
Displaying a Waveform Graph

2. Click **Wave Graph View**. A waveform graph appears.



Select the element whose data you want to display.

Switch the waveform displays ON or OFF.



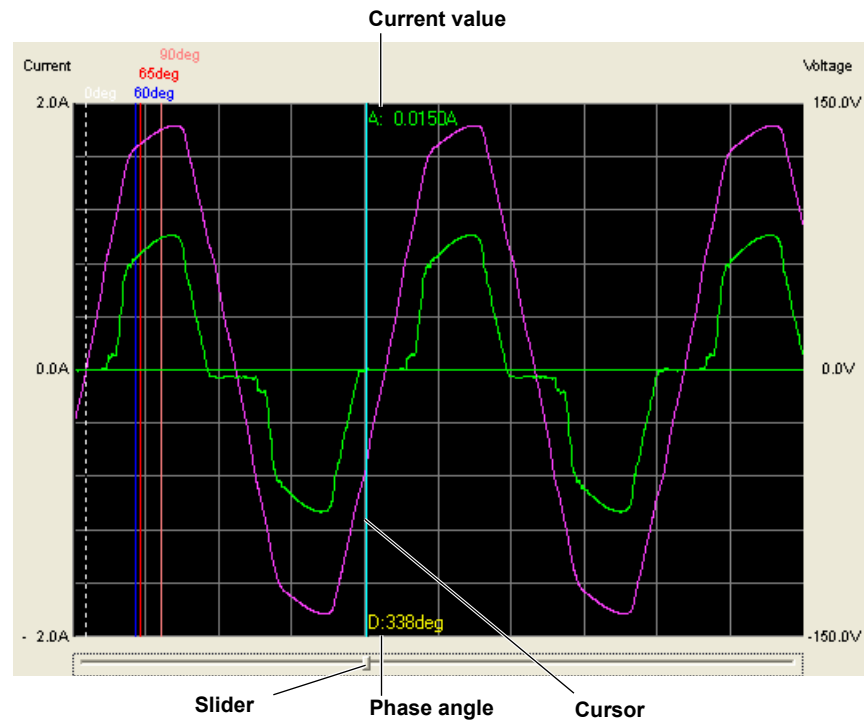
Changing the Y- Axis Scale (the Size of the Voltage and Current Waveforms)

Select ***100.0**, ***10.0**, ***50**, ***2.0**, ***1.0**, ***0.5**, or ***0.1**.



Using the Cursor to Display Current and Phase Angle Values

When you click an area of the waveform, a cursor will appear there. The current and phase angle values at the cursor position will be displayed.



Explanation

The waveform data is acquired immediately after the measurement for a compliance test is finished. The software acquires and displays a waveform graph of about two periods using 2200 points of current and voltage waveform data. You can display waveform graphs for each WT input element. This waveform data is different than the waveform data that is displayed in the waveform preview.

Note

Using the scroll bar will have no effect on the waveform graph display.

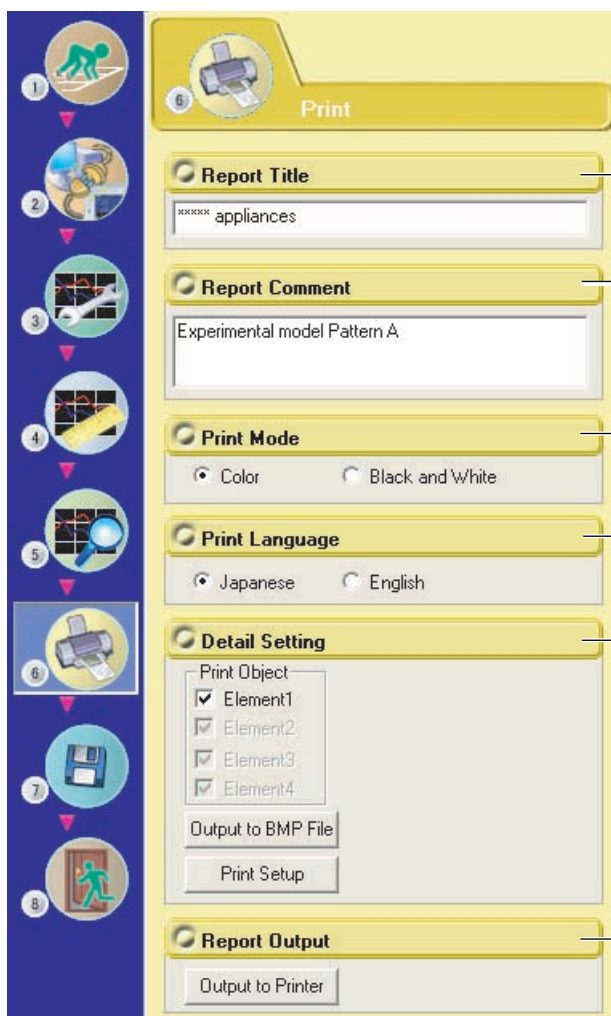
Numeric Value Displays below the Graph

- Frequency
The average value of all frequencies (frequency of the fundamental signal of the PLL source) within the measurement time.
- Current Peak (+)
Maximum positive value of the current waveform displayed.
- Current Peak (–)
Maximum negative value of the current waveform displayed.
- Voltage Peak (+)
Maximum positive value of the voltage waveform displayed.
- Voltage Peak (–)
Maximum negative value of the voltage waveform displayed.

10.1 Setting a Report's Title and Comments

Procedure

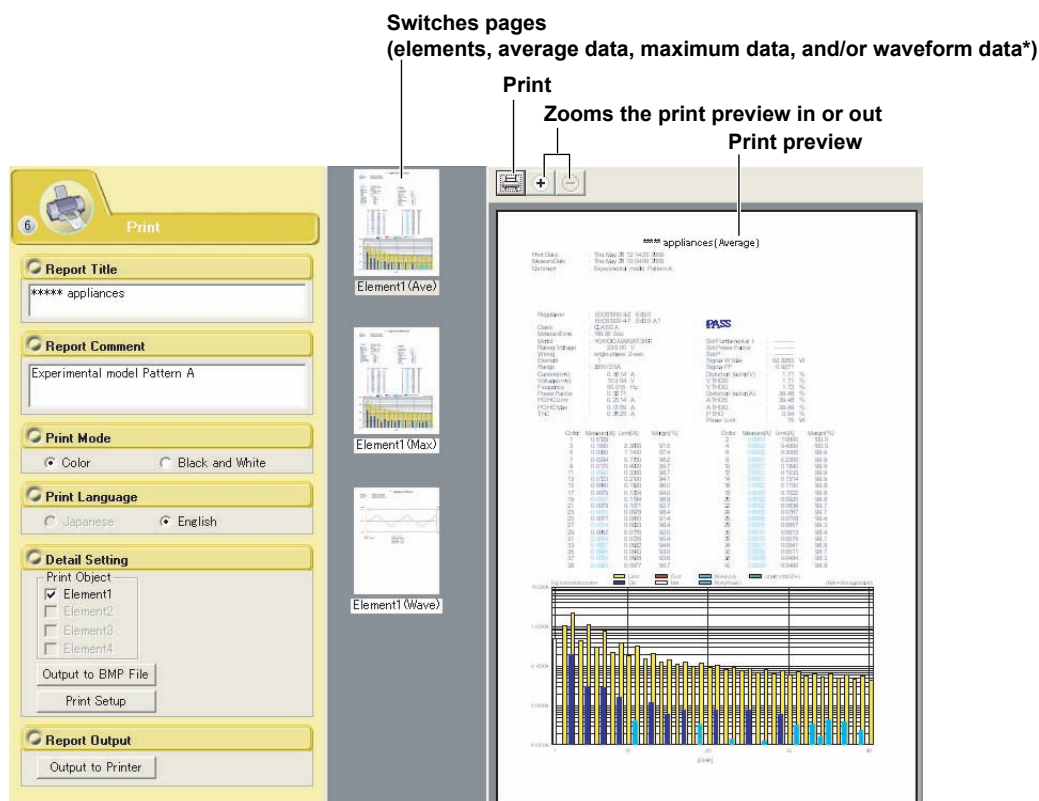
1. Select the  icon in the menu area. The Print submenu appears.



The screenshot shows the 'Print' submenu with the following sections and options:

- Report Title**: A text field containing 'xxxxx appliances'. A line points to it with the text 'Enter the report title (page 10-2).'.
- Report Comment**: A text field containing 'Experimental model Pattern A'. A line points to it with the text 'Enter report comments (page 10-2).'.
- Print Mode**: Two radio buttons, 'Color' (selected) and 'Black and White'. A line points to it with the text 'Set the print mode (section 10.2).'.
- Print Language**: Two radio buttons, 'Japanese' (selected) and 'English'. A line points to it with the text 'Set the print language (section 10.2)'.
- Detail Setting**: A section containing a 'Print Object' list with four checked items: 'Element1', 'Element2', 'Element3', and 'Element4'. Below the list are buttons for 'Output to BMP File' and 'Print Setup'. A line points to it with the text 'Set print options (section 10.3).'.
- Report Output**: A section containing a button for 'Output to Printer'. A line points to it with the text 'Print (section 10.4).'.

10.1 Setting a Report's Title and Comments



- * To display waveforms in the print preview and print them, select the “Add a waveform graph” check box under “Report” in the Option tab described in section 7.4.

2. Enter the report title and the report comments in their respective boxes.

Report Title
**** appliances

Report Comment
Experimental model Pattern A

Explanation

You can create reports using the data measured with the software.

Setting the Title and Comment of Reports

As necessary, you can set the title and comment of a report.

- **Number of Characters That Can Be Entered**

See the table below.

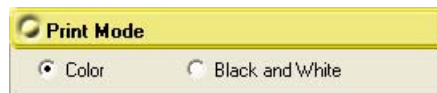
Item	Number of Characters That Can Be Entered
Title	Up to 40 characters.
Comment	Up to 600 characters. Up to 6 lines.

10.2 Setting the Print Mode and Print Language

Procedure

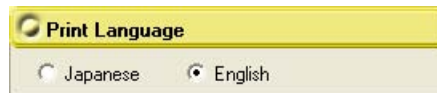
Selecting the Print Mode

1. Select Color or Black and White under Print Mode. When you change the print mode, the print preview in the setting and display area will change accordingly.



Selecting a Print Language

2. Select English or Japanese under Print Language. When you change the print language, the print preview in the setting and display area will change accordingly.

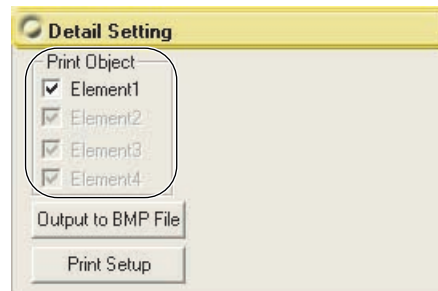


10.3 Setting Print Details (Detail Setting)

Procedure

Selecting the Elements Whose Data You Want to Print

1. In the Print Object box, select the elements whose data you want to print.



Selecting Whether or Not to Use the Margin Degree in Judgment

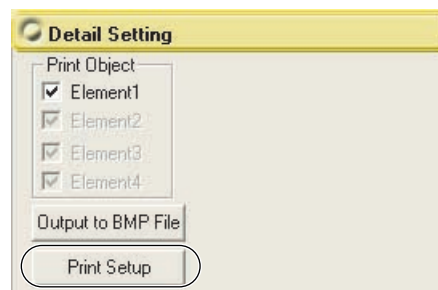
1. To print judgments that use the margin degree, select "The margin degree is used" check box under "Margin Degree" in the Option tab described in section 7.4.

Selecting Whether or Not to Print Waveforms

1. To print waveforms, select the "Add a waveform graph" check box under "Report" in the Option tab described in section 7.4.

Setting Up the Printer

1. Choose **Print Setup**. The Print Setup dialog box opens.

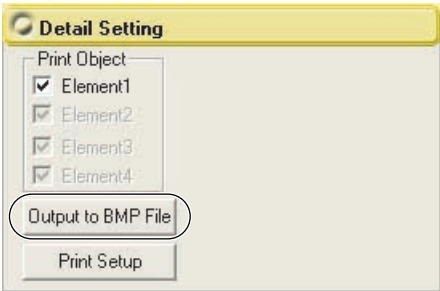


2. Enter appropriate settings for **Printer**, **Size**, **Source**, and **Orientation**.
3. Click **OK**.



Printing to a BMP File

- 1. Click **Output to BMP File**. A Save As dialog box appears.



- 2. Set the save location and file name.
- 3. Click **Save**.



Explanation

Selecting the Elements Whose Data You Want to Print

The elements that you can select are determined by the options that you select for Wiring and Object in section 7.2.

Margin Degree Judgments

If you select “The margin degree is used” check box under “Margin Degree” in the Option tab described in section 7.4, the judgments based on the margin values for each harmonic will be printed in red and blue (for information about what each color means, see section 9.2).

Print Setup

Make printer settings according to your system environment.

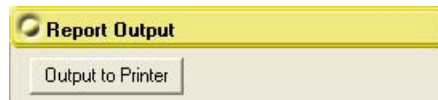
10.4 Printing

Procedure

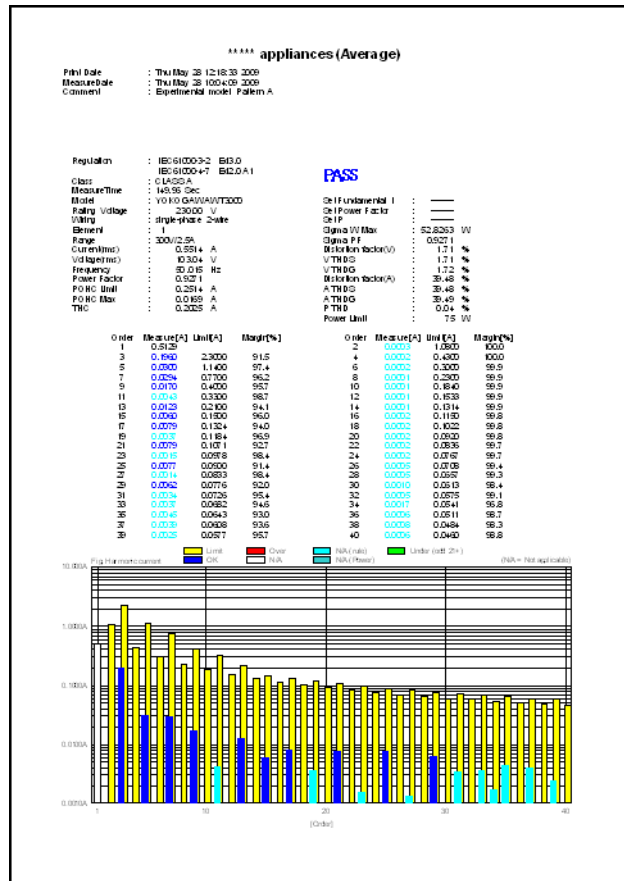
Printing a Report

You can print a report when measured data has been acquired or has been loaded from memory.

1. Click **Output to Printer** or the  button. A Print dialog box appears.



2. Enter appropriate settings for **Printer, Range, Copies**, etc.
3. Click **OK**. The report is printed.



Explanation

Set the printer according to the environment of the system that you are using.

Printing Reports

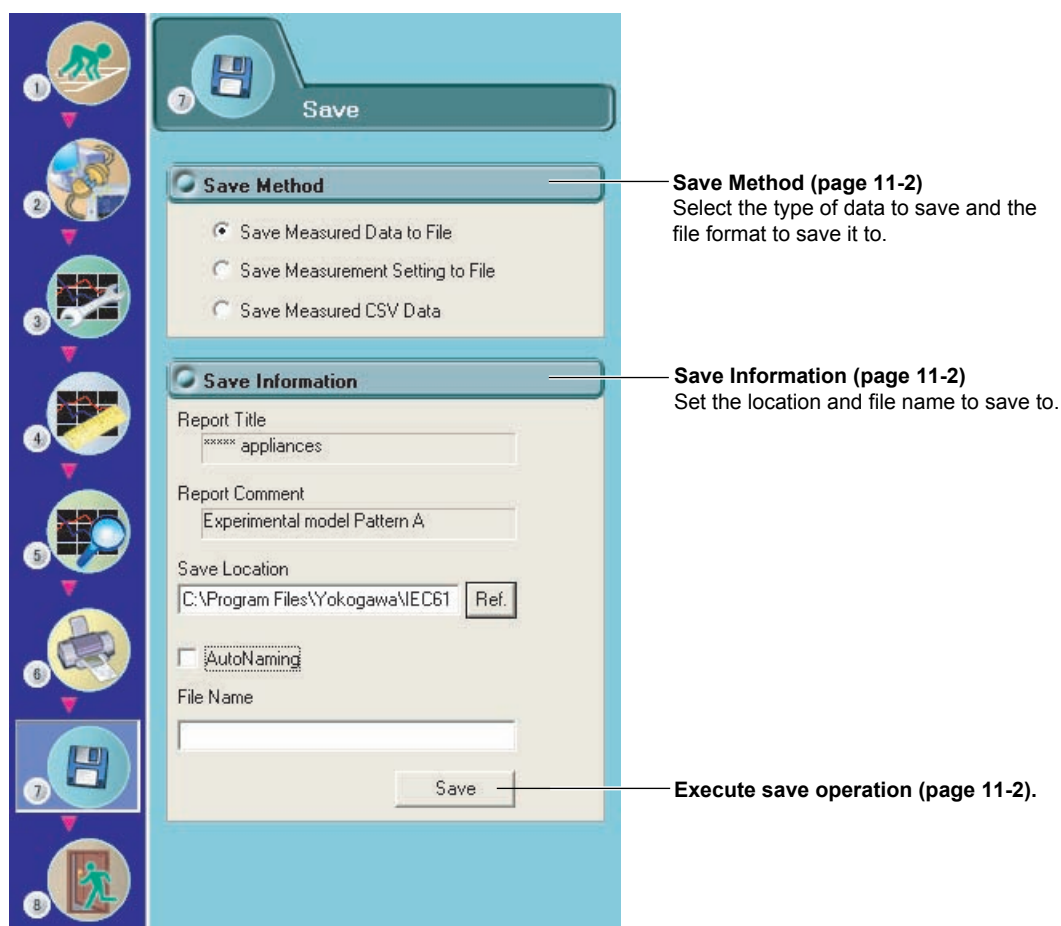
You can print a report when the measured data has been retrieved (or loaded).

You can print a report for each input element (see section 10.3).

11.1 Saving Setting Information and Measured Data

Procedure

1. Select the  icon in the menu area. The Save submenu appears.



11.1 Saving Setting Information and Measured Data

Configuring File Information Display Settings

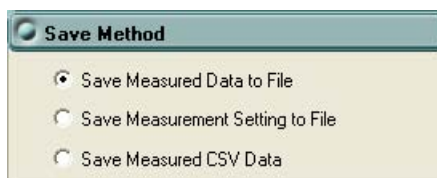
1. Right-click the file information heading area at the top of the setting and display area. A list of the different types of information that can be displayed appears.
2. Select the type of information that you want to be displayed.

Date	Report Title	Report Comment	Measured Data	File Name
2007/12/28 08:48:45	✓ Date	Experimental mo...	-	IEC61000
2007/12/28 08:49:10	✓ Report Title	Experimental mo...	-	IEC61000_3_12_0
2006/11/29 19:37:42	✓ Report Comment	Experimental mo...	-	IEC61000_3_12_1
	✓ Measured Data			
	✓ File Name			

Saving the Measured Data

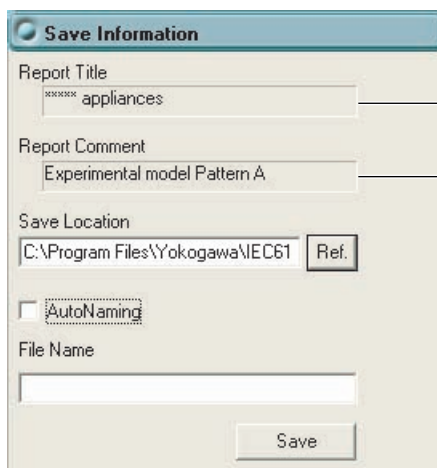
You can save the measured data when the measured data has been retrieved (or loaded).

1. Click **Save > Save Measured Data**.



The 'Save Method' dialog box has a title bar 'Save Method'. It contains three radio button options: 'Save Measured Data to File' (which is selected), 'Save Measurement Setting to File', and 'Save Measured CSV Data'.

2. After selecting a folder in the **Save in** box, enter the name of the file you want to save in the **File name** box.
3. Click **Save** to save the measured data.



The 'Save Information' dialog box has a title bar 'Save Information'. It contains several fields: 'Report Title' with the text 'appliances', 'Report Comment' with the text 'Experimental model Pattern A', 'Save Location' with the text 'C:\Program Files\Yokogawa\IEC61' and a 'Ref.' button, an 'AutoNaming' checkbox which is unchecked, and a 'File Name' text box. A 'Save' button is at the bottom right.

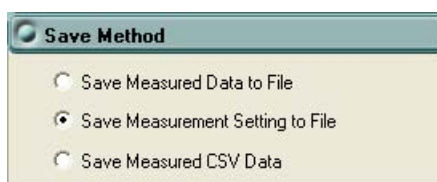
Section 10.1 explains how to set report titles and comments.

Note

You cannot save the measured data while the measurement is in progress.

Saving the Setting Information

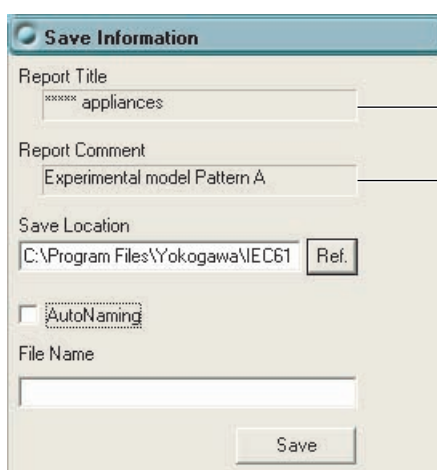
1. Click **Save > Save Setting Information**.



The **Save Method** dialog box contains three radio button options:

- ☐ Save Measured Data to File
- ☒ Save Measurement Setting to File
- ☐ Save Measured CSV Data

2. After selecting a folder in the **Save in** box, enter the name of the file you want to save in the **File name** box.
3. Click **Save** to save the setting information.



The **Save Information** dialog box contains the following fields and controls:

- Report Title:** Text box containing "XXXXXXXX appliances".
- Report Comment:** Text box containing "Experimental model Pattern A".
- Save Location:** Text box containing "C:\Program Files\Yokogawa\IEC61" and a **Ref.** button.
- AutoNaming:** A checkbox that is currently unchecked.
- File Name:** An empty text box.
- Save:** A button at the bottom right.

Section 10.1 explains how to set report titles and comments.

Note

You cannot save the setting information while the measurement is in progress.

Explanation

Kinds of File Information

- Date: When the file was saved. Displayed in this format: year/month/day hour:minute:second
- Report Title (See section 10.1)
- Report Comment (See section 10.1)
- Measured Data: When measured data is included in a file, an asterisk appears.
- Click ▼ or ▲ to switch between sorting in ascending and descending order.

Saving Measured Data

You can use this software to save the harmonic measurement data and waveform data that the PC has acquired from the WT to a file. When the software saves this data, it will also save the WT harmonic measurement conditions along with the setting information described below.

File Name/Extension

- You can select any file name that the PC will recognize.
- When you choose to save a file, two files will be saved with the same file names but with these different extensions:
Extension: .fdt Measured data
 .ini Setting information

Saving Setting Information

When in online mode, the software can save the following setting information to a file.

- Measurement and judgement conditions (see chapter 7)
- All display settings (see chapters 8 and 9)
- Report titles and comments (see section 10.1)

File Name/Extension

- You can select any file name that the PC will recognize.
- Extension: .ini

11.2 Saving Measured Data in CSV Format

Once the following kinds of data has been acquired or loaded, it can be saved to CSV file format.

- Numeric data
- Waveform data

Note

You cannot save measured data in CSV format while measurement is taking place.

1. Select **Save Measured CSV Data**.

Save Method

☐ Save Measured Data to File
☐ Save Measurement Setting to File
☒ Save Measured CSV Data

2. Specify the **Save Location**, and enter the file name in the File Name box.
3. Click **Save**. The measured data is saved to CSV format.

Save Information

Report Title
XXXXXXXX appliances

Report Comment
Experimental model Pattern A

Save Location
C:\Program Files\Yokogawa\IEC61 Ref.

☐ AutoNaming

File Name

Save

Section 10.1 explains how to set report titles and comments.

11.2 Saving Measured Data in CSV Format

Explanation

You can save data to CSV file format after it has been acquired or loaded. When you save the data in CSV format, you can view it using a PC spreadsheet program (such as Microsoft Excel).

Note

This software cannot load CSV files.

File Name/Extension

You can select any file name that the PC will recognize.

Extension: .csv

Data Types

The following data is saved for each measured input element:

- Voltage values
- Current values
- Active power
- Φ (phase angle)
- Apparent power
- Circuit power factor
- FreqPLL
- None (Blank column)
- Uthd : Voltage THD
- UthdG
- UthdS
- Ithd : Current THD
- IthdG
- IthdS
- Distortion factor (P THD)
- Phi
- FreqU
- Thc
- Pohc
- PhiU1_U2
- PhiU1_U3
- Voltage waveform data (2200 points)
- Current waveform data (2200 points)

Data Size

Under the following circumstances, the software will produce an approximately 9-MB file with about 18000 lines.

- Wiring pattern set to 3P4W 400 V, and the measured input elements set to 1 to 3
- Measurement time set to 2 min 30 s

Example of Numeric Data Saved to CSV Format and Then Opened Using Microsoft Excel

CSV format version

	A	B	C	D	E	F	G	H
1	Version	0.01						
2	Date : Thu Apr 09 15:54:48 2009							
3	Data Count	750						
4								
5	Element1 [Voltage]							
6	TOTAL	DC		1	2	3	4	5
7	0	227.4638	9.91 E+37	227.3139	0.012305	3.133281	0.014134	6.849628
8	1	227.7043	9.91 E+37	227.5568	0.011549	3.069359	0.008112	6.812357
9	2	228.7904	9.91 E+37	228.6054	0.085499	3.927741	0.055045	7.480665
10	3	228.9171	9.91 E+37	228.7328	0.004214	3.927471	0.012069	7.473825
11	4	229.1548	9.91 E+37	228.97	Harmonic measurement data	11231	7.390073	
12	5	229.2077	9.91 E+37	229.0322	0.013065	3.799509	0.00228	7.328438
13	6	229.1287	9.91 E+37	228.9533	0.004982	3.786766	0.006735	7.326857
14	7	228.9838	9.91 E+37	228.8042	0.008128	3.85345	0.001724	7.409199
15	8	229.0703	9.91 E+37	228.89	0.018216	3.867439	0.006321	7.427949
16	9	229.3022	9.91 E+37	229.1293	0.020213	3.735632	0.009218	7.30666
17	10	229.1132	9.91 E+37	228.9341	0.019301	3.835332	0.008106	7.406432
18	11	229.2236	9.91 E+37	229.0517	0.014132	3.711365	0.020655	7.283534
19	12	229.5771	9.91 E+37	229.4232	0.014941	3.366014	0.012666	6.946555

Harmonic order →

Measured data number ↓

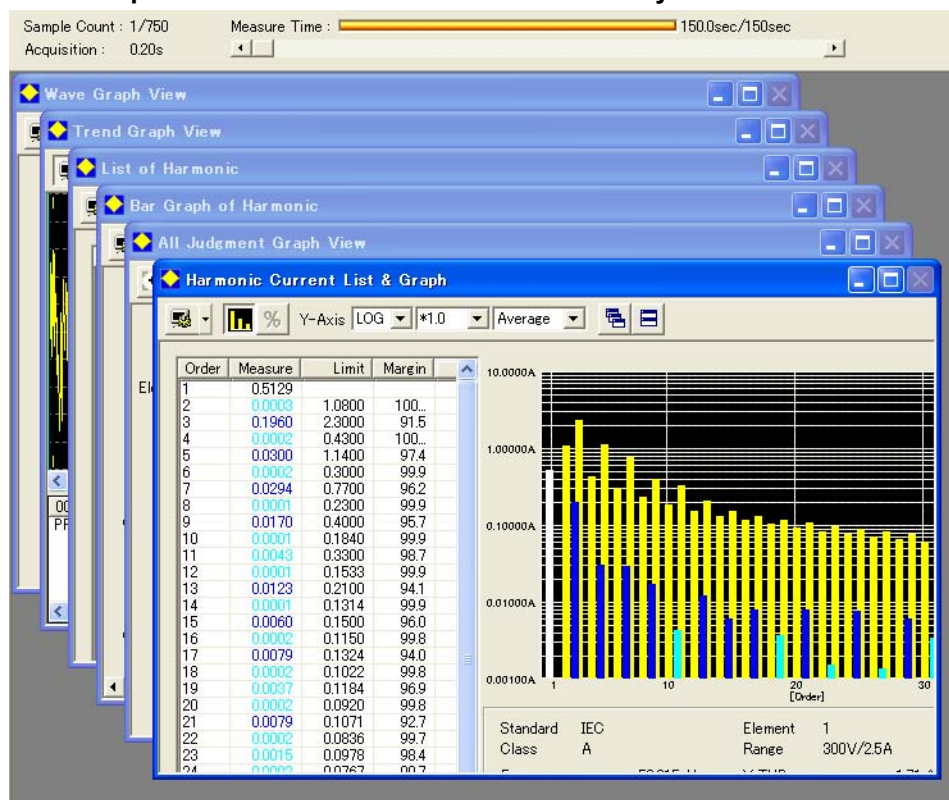
pass1.csv

12.1 Cascading Windows

Procedure

Click . The windows are cascaded so that you can see the title of each window.

An Example of Cascaded Windows within the Analysis Window



Explanation

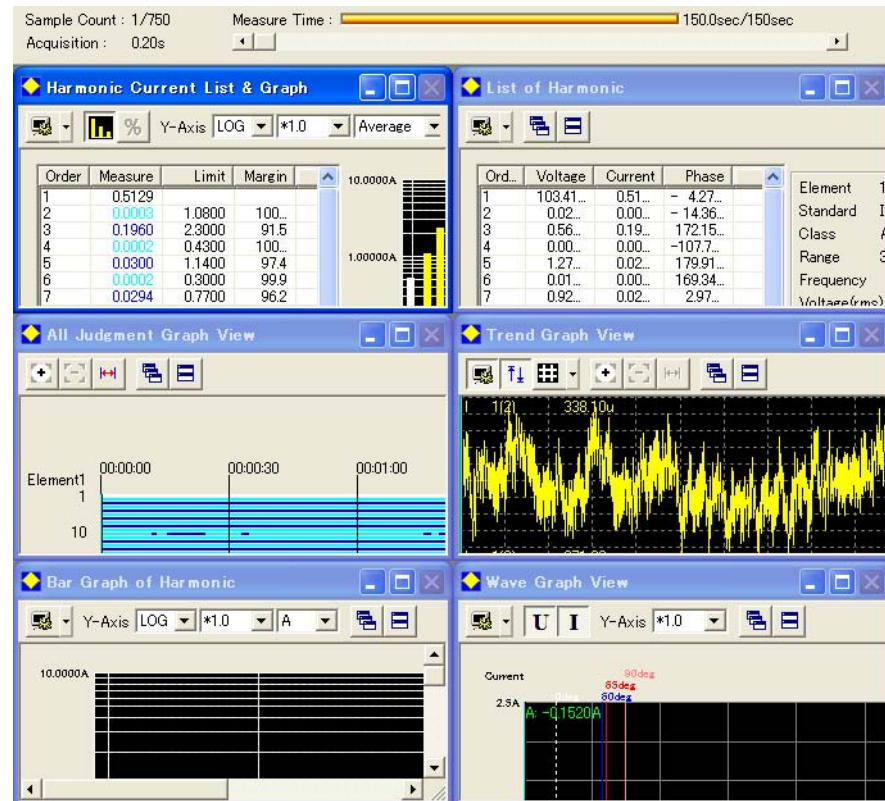
- Windows are cascaded so that the title of all displayed windows can be seen.
- The active graph or list window becomes the front window after the cascade operation.
- The cascade order varies depending on the type of displayed window.

12.2 Tiling Windows

Procedure

Click . The windows are tiled so that they do not overlap with each other.

An Example of Tiled Windows within the Analysis Window



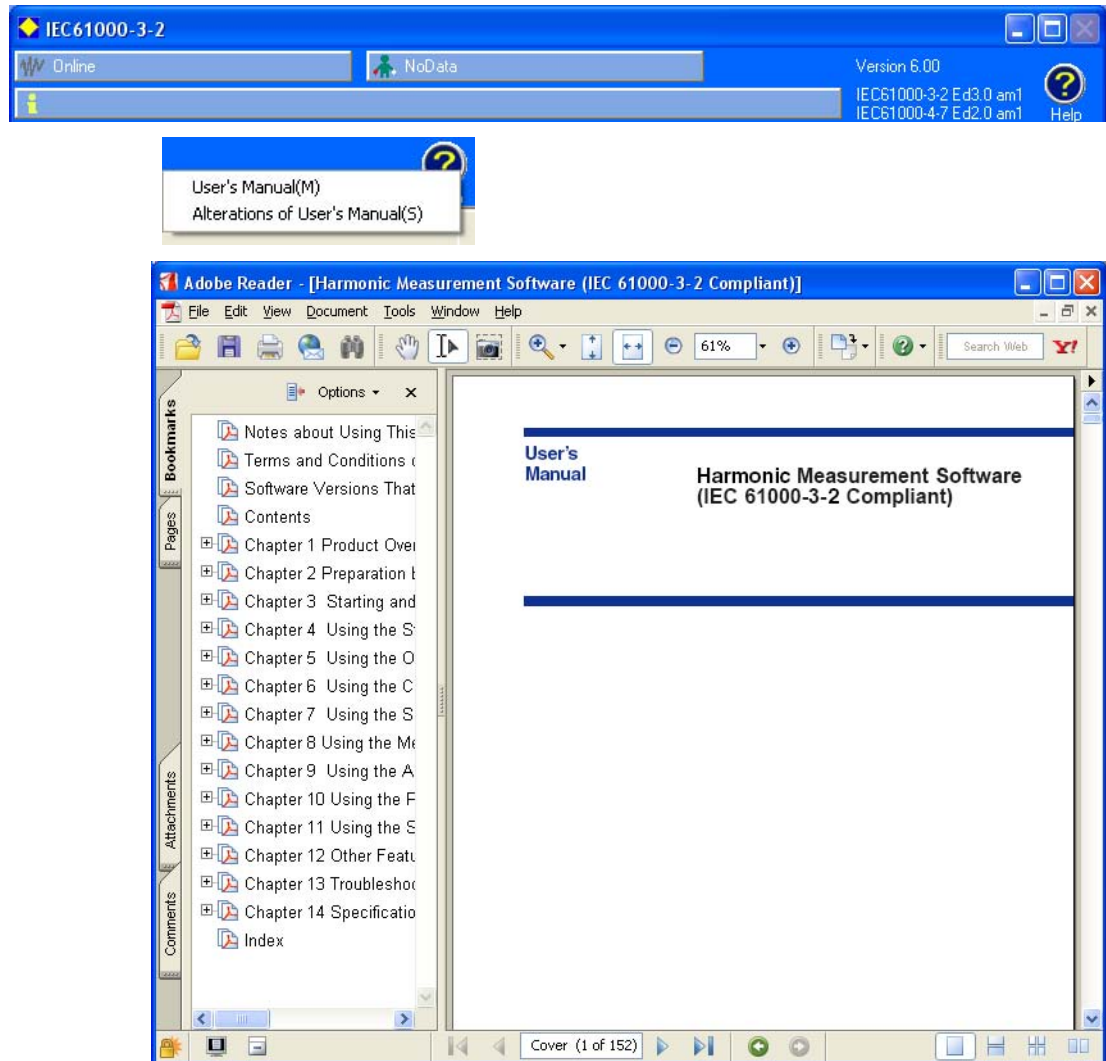
Explanation

- All the displayed windows are tiled so that the windows do not overlap each other.
- The active graph or list becomes the active window after carrying out the tile operation.
- The arrangement order varies depending on the type of displayed windows.

12.3 Using the Help Function

Procedure

Click , the help button. If Adobe Reader is installed on the PC, it will start up and open the PDF User's Manual for this software.



Explanation

Online Help

The user's manual is displayed as a help document in PDF (Portable Document Format). You can find information about operating procedures of this software and terminology. You can view PDF files using Adobe Reader, a freeware.

If there is an alteration notice, you can display it by clicking Help and then clicking **Alterations of User's Manual**. This will open a PDF file of the alteration notice.

Viewing the Most Recent User's Manual or Alteration Notice

To obtain the most recent PDF files of the user's manual and alteration notice, go to the following Web page, and then browse to the download page.

<http://tmi.yokogawa.com/service-support/downloads/>

12.3 Using the Help Function

Rename the downloaded user's manual and alteration notice as indicated below according to the product that you are using, and copy (overwrite) the files in the software installation folder that you specified when you carried out the steps on page 2-8. You will be able to view the most recent operating instructions by selecting the user's manual or alteration notice from the Help menu.

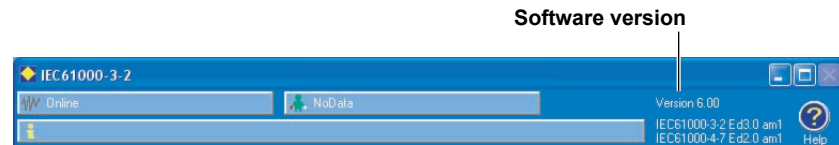
Product	User's Manual File Name	Alteration Notice File Name
WT3000	IM761922-06E.pdf	Alterations-06E.pdf

Note

- You can download Adobe Reader from Adobe System's Web page.
 - The most recent user's manual and alteration notice that you can download from YOKOGAWA's Web page correspond to the most recent version of this software program. Update the software program as necessary. The program for updating the software can be downloaded from YOKOGAWA's Web page above.
-

12.4 Viewing Version Information

The IEC 61000-3-2 Harmonic Measurement Software version number appears in the information area.



Note

- The software version is different for each operation mode indicated below.
 - IEC 61000-3-2 Harmonic Measurement
 - IEC 61000-3-3 Voltage Fluctuation and Flicker Measurement
 - IEC 61000-3-11 Voltage Fluctuation and Flicker Measurement
 - IEC 61000-3-12 Harmonic Measurement
 - IEC 61000-3-2 Harmonic Measurement (Old Version)
 - IEC 61000-3-3 Voltage Fluctuation and Flicker Measurement (Old Version)If any function is updated, the version of the other function may not change.
- For the most recent version of the software, check the YOKOGAWA's Web page below.
<http://tmi.yokogawa.com/products/digital-power-analyzers/>
The program for updating the software as well as the most recent user's manual and alteration notice (see section 12.4) can be downloaded from YOKOGAWA's Web page above.

13.1 Troubleshooting

If a message is displayed on the PC display, see section 13.2, “Error Messages.” If servicing is necessary or if the software is not operating correctly after performing the corrective actions, contact your nearest YOKOGAWA dealer.

Problems and Solutions

If you cannot connect to the WT3000 via GP-IB:

A GP-IB connection made to the WT may not work properly if the GP-IB card that is used is not made by NI (National Instruments). We recommend that you use a National Instruments GP-IB card (see section 1.2).

Measurement stops suddenly.

Close the memory-resident software running on the PC. For example, if virus checking software frequently checks the communications between this software and the PC, the performance of the PC may decline drastically. If you choose to stop the virus check and use the PC, please do so in a network environment that is well protected against viruses.

13.2 Error Messages

Message	Corrective Action
Measured data will be initialized. Do you want to execute?	Select OK to initialize the measured data. Otherwise, select Cancel.
Data was lost. Please check your settings and try again.	The communication may be disconnected. Check the cable, noise, etc.
Connection error. Please check your settings and try again.	Check the following items. • The WT is turned ON. • The GP-IB or Ethernet cable is connected properly. • For GP-IB, check that a unique GP-IB address is assigned within the system. Check that the GP-IB address specified on the WT matches the address specified on the software. Check that the GP-IB communication driver is installed correctly in the PC. • For Ethernet, check that the IP address, user name, and password specified on the WT match those specified on the software.
Peak over. Please check your settings and try again.	Check that the voltage or current range is appropriate.
Frequency error. Please check your settings and try again.	Check the frequency and voltage range.
Unrecognized error. Please check your settings and try again.	An unexpected error occurred. Contact your nearest YOKOGAWA dealer.
All the data will be discarded. Do you want to continue?	Select OK to discard the current data. Otherwise, select Cancel.
Write failed.	Check the destination medium. • Check that the storage medium is present. • Check that there is enough free space on the storage medium. • Check that the storage medium is formatted. • Check that the storage medium is not write-protected.
Please input a value from 0.0001 to 99999.9999. Please input a value from 0.01 to 999.99. Please input a value from 1.00 to 99.99. Please input a value from 0.10 to 99.99. Please input value from 0:30 to 15:00. Please input a value from 1 to 99999. Please input a value from 1 to 99. Please input a value from 0.10 to 9.99.	The value you tried to specify is out of range. Set the value within the allowed range.

Specifications

Item	Specification
Software*	Harmonic measurement/judgment software that can measure harmonic currents and judge the results of those measurements based on IEC or JIS standards. Displays and prints measurements and judgments. The software's executable file name is IEC61000.exe.
Compatible measurement devices*	WT3000 (Models 760301, 760302, 760303, and 760304)
Applicable standards*	IEC 61000-3-2 (Electromagnetic compatibility (EMC) - Part 3-2: Limits - Limits for harmonic current emissions (equipment input current ≤ 16 A per phase)) Edition 3.0 and A1 of the Edition 3.0 • EN61000-3-2 (2006) • IEC61000-4-7 Edition 1.0, Edition 2.0, A1 of the Edition 2.0 • JIS C61000-3-2 (2005), abbreviated as JIS
Features	Acquisition and loading of measured data and waveform data to be judged. • Configuration of WT measurement conditions • Online acquisition of measured data and waveform data from the WT (online mode) • Loading of previously saved measured data and waveform data (offline mode) Measurement modes* • Compliance testing • In online mode Measures the harmonics of the data acquired from the WT, and judges those harmonics based on IEC 61000-3-2 Edition 3.0 or JIS. • In offline mode Judges the measured data loaded from a file according to IEC 61000-3-2 Edition 3.0 or JIS. • Test preview Only available in online mode. As the WT measures the harmonic appear on a list or bar graph of measured values and waveform. Standard and measurement settings Sets the classification of the equipment under test (EUT) as defined in IEC 61000-3-2 Edition 3.0 or JIS and evaluation conditions within each class. Measurement time The time from the start to the end of measurement. Measurement time can be set in one-second intervals within the range of 0 h 0 min 1 s to 24 h 0 min 0 s. Report titles/comments Report titles and comments can be entered. Report formats: color/black and white; English/Japanese. Reports are printed and saved along with measured data. Measure start/stop Measurement can be started in online mode. Display of judgment results, measured data, and waveform data When a compliance test is performed, the software will display judgments as to whether or not the data complies with IEC 61000-3-2 Edition 3.0 or JIS, along with the measured data and waveform data that was judged. • Display of all judgment results within the measurement time Determines whether or not all of the data within the measurement time is within the set limits, and displays the result. • Harmonic current list and graph display Displays the measured harmonic values and the limits for each order set by the standard for those values in both a list and a bar graph. • Bar graph display of harmonic voltage, current, and phase angle Displays the measured data for each harmonic in a color-coded bar graph. • List display of harmonic voltage, current, and phase angle values Displays the measured data for each harmonic in a color-coded list.

Specifications

Item	Specification
	- Trend graph display Displays a graph that shows data fluctuations over time. - Waveform display of voltage and current Displays a waveform of data measured immediately after the measurement time (displays approximately two waveform periods). - Repeatability of measured data Compares the harmonic measurement data that is saved to files, and displays the difference in the measured data on a bar graph and numerical list. Enables confirmation of whether the difference between data measured using the same product is within 5% as defined by the standard (confirmation of repeatability).
	Loading of measured data, waveform data, and setting information - Loading and saving of setting information Setting information files that contain measurement settings, the measurement time setting, and report titles and comments can be saved. Saved setting information files can be loaded. - Loading and saving of measured data and waveform data Harmonic measurement data and waveform data files can be saved. Measurement settings, the measurement time setting, and report titles and comments are also saved, along with the WT harmonic measurement conditions set using the software. The saved measured data, waveform data, harmonic measurement conditions, and setting information can be loaded. - Saving of measured data and waveform data to CSV format Harmonic measurement data and waveform data can be saved to CSV files. Saved CSV files can be opened with PC programs that support CSV file format. Printing and saving of reports Reports can be saved to .bmp files. Report files can also be printed.
System requirements	See section 1.2.

* The width of the window function (measurement period) for measurements on the WT3000 is the same as defined by IEC61000-4-7.

Edition No. of the IEC61000-4-7	Window Function of the WT3000 (Measurement Period)	
	50Hz	60Hz
Edition 1.0	16 cycles (320 ms)	16 cycles (267 ms)
Edition 2.0	10 cycles (200 ms)	12 cycles (200 ms)
A1 of the Edition 2.0	10 cycles (200 ms)	12 cycles (200 ms)

Compatibility between the WT3000 Precision Power Analyzer and IEC

In the EN61000-3-2:2000 (IEC61000-3-2 Edition 2.2:2004) standard, the requirements for measurement instruments are specified in EN61000-4-7 (IEC61000-4-7).

The WT3000 complies with the items related to EN61000-3-2:2006 (IEC61000-3-2 Edition 3.0:2005) of EN61000-4-7 shown below in the range indicated in the table on the next page.*

- EN61000-4-7:1993 (IEC61000-4-7 Edition 1.0:1991)
- EN61000-4-7:2002 (IEC61000-4-7 Edition 2.0:2002)
- EN61000-4-7:2002 and A1:2009 (IEC61000-4-7 Edition 2.0:2002 and A1:2008)

* This software complies with IEC 61000-3-2 Ed. 3.0 Amendment 1. (The repeatability requirement specifies that measured values must be within less than $\pm 5\%$ of the average values.) As of April 1, 2009, there are no specifications in EN 61000-3-2 (2006) that correspond to IEC 61000-3-2 Ed. 3.0 Amendment 1.

Specifications

EN61000-4-7:1993 (IEC61000-4-7 Edition 1.0:1991)

Item	EN61000-4-7:1993 IEC61000-4-7 Edition 1.0:1991	WT3000	Compliance
Current measurement error	5% of the permissible limits or 0.15% I _r of the rated current I _r , whichever is greater	Frequency of the 40 th order of the fundamental frequency 60 Hz When the crest factor is 3, 2.5% of reading+0.05% of range → Error within 5% at the limit that is greater than or equal to 2% of the input range When the crest factor is 6, 2.5% of reading+0.1% of range → Error within 5% at the limit that is greater than or equal to 4% of the input range Accuracy at 2.4 kHz (direct input)	Compliant within the range in the left column for direct input
Instrumental loss of the current input circuit	Voltage drop of 0.15 V or less	Instrumental loss Approx. 5.5 mΩ + approx. 0.03 μH	Complies up to approx. 27 Apk
Crest factor of the current input circuit	3 10 Arms range or less: 3.5 Range above 10 Arms: 2.5 Overload display is necessary.	3 or 6 With overload display	Compliant
Range structure of the current input circuit and withstand overload input	Direct input range: 0.1, 0.2, 0.5, 1, 2, 5, 10, and 16A ranges are desirable	0.5, 1, 2, 5, 10, 20, 30 A range (when the crest factor is 3) 0.25, 0.5, 1, 2.5, 5, 10, and 15A range (when the crest factor is 6)	Compliant in the range indicated in the left column. To make accurate measurements, pay attention to the crest factor and range selections.
	External sensor range: 0/1 V to 10 V are adequate.	0.05, 0.1, 0.2, 0.5, 1, 2, 5, 10 V (when the crest factor is 3) 0.025, 0.05, 0.1, 0.25, 0.5, 1, 2.5, 5 V (when the crest factor is 6)	
	Excessive input is 1.2 times the range (continuous) and 10 times (1 s)	Direct input Peak value of 90 A or rms value of 33 A, whichever is less (continuous) Peak value of 150 A or rms value of 50 A, whichever is less (1 s) External sensor input Peak value less than or equal to 5 times the range (continuous) Peak value less than or equal to 10 times the range (1 s)	
Anti-aliasing filter	50 dB or higher	50 dB or higher for harmonic components up to the 40 th order at the fundamental frequency 50/60 Hz	Compliant
Window function shape	Rectangular	Rectangular	Compliant
Window width	16 cycles (50 Hz and 60Hz)	16 cycles (50 Hz and 60Hz)	Compliant
Relative deviation of the sampling frequency and fundamental frequency	Within ±0/03%	Within ±0/03%	Compliant
Grouping of interharmonics	Not required	No grouping function	Compliant
Smoothing	Time constant: 1.5 s	Time constant: 1.5 s	Compliant
Window gap and overlap	No gap and no overlap	No gap and no overlap	Compliant
General specifications	The effects of temperature, humidity, supply voltage, common-mode voltage, static electricity, and electromagnetic field must be specified.	See the items in the general specifications	Compliant in the range of the general specifications

EN61000-4-7:2002 (IEC61000-4-7 Edition 2.0:2002)

Item	EN61000-4-7:2002 IEC61000-4-7 Edition 2.0:2002	WT3000	Compliance
Current measurement error	5% of the permissible limits or 0.15% I _r of the rated current I _r , whichever is greater	Frequency of the 40 th order of the fundamental frequency 60 Hz When the crest factor is 3, 2.5% of reading+0.05% of range → Error within 5% at the limit that is greater than or equal to 2% of the input range When the crest factor is 6, 2.5% of reading+0.1% of range → Error within 5% at the limit that is greater than or equal to 4% of the input range Accuracy at 2.4 kHz (direct input)	Compliant within the range in the left column for direct input
Instrumental loss of the current input circuit	Voltage drop of 0.15 V _{rms} or less	Instrumental loss Approx. 5.5 mΩ + approx. 0.03 μH	Complies up to approx. 27 Arms
Crest factor of the current input circuit	5 Arms range or less: 4 10 Arms range or less: 3.5 Range above 10 Arms: 2.5 Overload display is necessary.	3 or 6 With overload display	Compliant
Range structure of the current input circuit and withstand overload input	Direct input range: 0.1, 0.2, 0.5, 1, 2, 5, 10, 20, 50, and 100A ranges are desirable	0.5, 1, 2, 5, 10, 20, 30 A range (when the crest factor is 3) 0.25, 0.5, 1, 2.5, 5, 10, and 15A range (when the crest factor is 6)	Compliant in the range indicated in the left column. To make accurate measurements, pay attention to the crest factor and range selections.
	External sensor range: 0/1 V to 10 V are adequate.	0.05, 0.1, 0.2, 0.5, 1, 2, 5, 10 V (when the crest factor is 3) 0.025, 0.05, 0.1, 0.25, 0.5, 1, 2.5, 5 V (when the crest factor is 6)	
	Excessive input is 1.2 times the range (continuous) and 10 times (1 s)	Direct input Peak value of 90 A or rms value of 33 A, whichever is less (continuous) Peak value of 150 A or rms value of 50 A, whichever is less (1 s) External sensor input Peak value less than or equal to 5 times the range (continuous) Peak value less than or equal to 10 times the range (1 s)	
Anti-aliasing filter	50 dB or higher	50 dB or higher for harmonic components up to the 40 th order at the fundamental frequency 50/60 Hz	Compliant
Window function shape	Rectangular	Rectangular	Compliant
Window width	10 cycles (50 Hz)/12 cycles (60 Hz)	10 cycles (50 Hz)/12 cycles (60 Hz)	Compliant
Relative deviation of the sampling frequency and fundamental frequency	Within ±0/03%	Within ±0/03%	Compliant
Grouping of interharmonics	Required	Grouping function available	Compliant
Smoothing	Time constant: 1.5 s	Time constant: 1.5 s	Compliant
Window gap and overlap	No gap and no overlap	No gap and no overlap	Compliant
General specifications	The effects of temperature, humidity, supply voltage, common-mode voltage, static electricity, and electromagnetic field must be specified.	See the items in the general specifications	Compliant in the range of the general specifications

Specifications

EN61000-4-7:2002 and A1:2009 (IEC61000-4-7 Edition 2.0:2002 and A1:2008)

Item	EN61000-4-7:2002 and A1:2009 WT3000 IEC61000-4-7 Edition 2.0:2002 and A1:2008		Compliance
Current measurement error	5% of the permissible limits or 0.15% I _r of the rated current I _r , whichever is greater	Frequency of the 40 th order of the fundamental frequency 60 Hz When the crest factor is 3, 2.5% of reading+0.05% of range → Error within 5% at the limit that is greater than or equal to 2% of the input range When the crest factor is 6, 2.5% of reading+0.1% of range → Error within 5% at the limit that is greater than or equal to 4% of the input range Accuracy at 2.4 kHz (direct input)	Compliant within the range in the left column for direct input
Instrumental loss of the current input circuit	Voltage drop of 0.15 V _{rms} or less	Instrumental loss Approx. 5.5 mΩ + approx. 0.03 μH	Complies up to approx. 27 Arms
Crest factor of the current input circuit	5 Arms range or less: 4 10 Arms range or less: 3.5 Range above 10 Arms: 2.5 Overload display is necessary.	3 or 6 With overload display	Compliant
Range structure of the current input circuit and withstand overload input	Direct input range: 0.1, 0.2, 0.5, 1, 2, 5, 10, 20, 50, and 100A ranges are desirable	0.5, 1, 2, 5, 10, 20, 30 A range (when the crest factor is 3) 0.25, 0.5, 1, 2.5, 5, 10, and 15A range (when the crest factor is 6)	Compliant in the range indicated in the left column. To make accurate measurements, pay attention to the crest factor and range selections.
	External sensor range: 0/1 V to 10 V are adequate.	0.05, 0.1, 0.2, 0.5, 1, 2, 5, 10 V (when the crest factor is 3) 0.025, 0.05, 0.1, 0.25, 0.5, 1, 2.5, 5 V (when the crest factor is 6)	
	Excessive input is 1.2 times the range (continuous) and 10 times (1 s)	Direct input Peak value of 90 A or rms value of 33 A, whichever is less (continuous) Peak value of 150 A or rms value of 50 A, whichever is less (1 s) External sensor input Peak value less than or equal to 5 times the range (continuous) Peak value less than or equal to 10 times the range (1 s)	
Anti-aliasing filter	50 dB or higher	50 dB or higher for harmonic components up to the 40 th order at the fundamental frequency 50/60 Hz	Compliant
Window function shape	Rectangular	Rectangular	Compliant
Window width	10 cycles (50 Hz)/12 cycles (60 Hz)	10 cycles (50 Hz)/12 cycles (60 Hz)	Compliant
Relative deviation of the sampling frequency and fundamental frequency	Within ±0/03%	Within ±0/03%	Compliant
Grouping of interharmonics	Required Applies to the second and higher harmonics.	Grouping function available Applies to the second and higher harmonics.	Compliant
Smoothing	Time constant: 1.5 s	Time constant: 1.5 s	Compliant
Window gap and overlap	No gap and no overlap	No gap and no overlap	Compliant
General specifications	The effects of temperature, humidity, supply voltage, common-mode voltage, static electricity, and electromagnetic field must be specified.	See the items in the general specifications	Compliant in the range of the general specifications

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